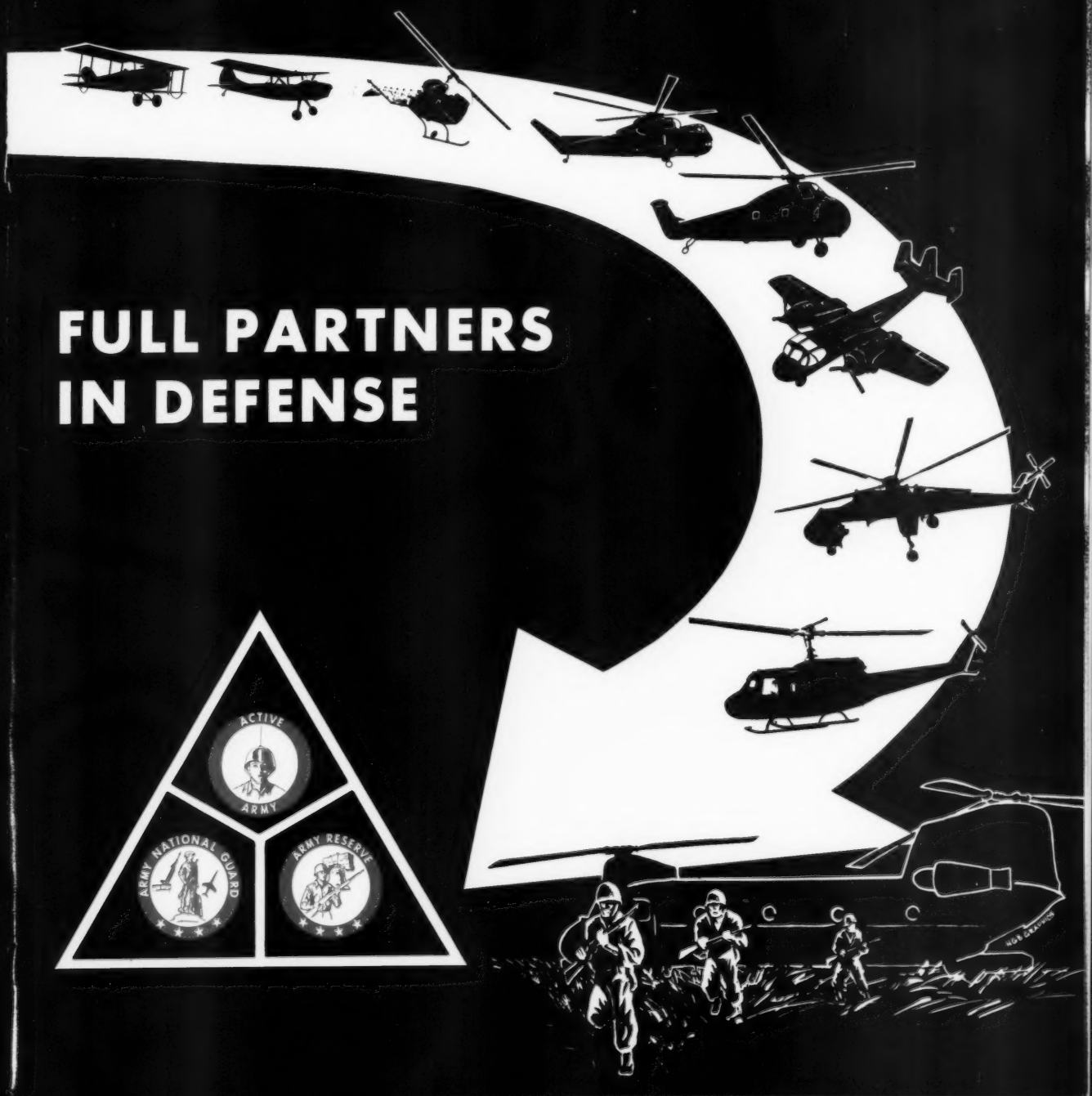
UNITED STATES ARMY JULY 1971

AVIATION DIGEST



UNITED STATES ARMY AVIATION DIGEST

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Cover art by Mr. James F. Jordan, National Guard Bureau Graphics

The mission of the U. S. ARMY AVIATION DIGEST is to provide information of an operational or functional nature concerning safety and aircraft accident prevention, training, maintenance, operations, research and development, aviation medicine, and other related data.

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Articles, photos, and items of interest on Army aviation are invited. Direct communication is authorized to: Editor, U. S. Army Aviation Digest, Fort Rucker, Ala. 36360.

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Today, and in the future, the active Army alone cannot provide the Army's share of a balanced military force that will ensure our nation's survival. Mr. Melvin R. Laird, Secretary of Defense, acknowledged this lack of capability of the active services when he made the following statement: "Guard and Reserve units and individuals of the Selected Reserves will be prepared to be the initial and primary source for augmentation of the active forces in any future emergency requiring a rapid and substantial expansion of the active forces." This role of the Army Reserve Components takes two forms: to fill the ranks of active Army units by the addition of trained individuals, and to provide additional combat, combat support and combat service support units to augment active Army forces.

One of the most important aspects of this augmentation is in the field of Army aviation. Force balance and TOE standardization between the active structure and Reserve Components is now an obtainable goal. As a result of this balance and standardization, and to some degree cost, a significant part of the Army's aviation capability will be maintained in the Reserve Components. These aviation elements are an integral part of the total Army requirements for future contingencies, therefore, Reserve Component aviation must have the same operational readiness as active Army aviation. Each of us, whether active Army, National Guard or Army Reserve, has a part to play in the achievement of this degree of readiness. The challenge is great, but with team effort from all it can be met.

Lieutenant General W. R. Peers
Chief, Office of Reserve Components
HQ, Department of the Army

THE ONE ARMY TEAM

WITH THE WAR in the Republic of Vietnam tapering down, some significant changes will be made in the armed forces of the United States. One change will be a reduction in the size of the active Army. Another change will be an increase in the combat capability of the Army's Reserve Components—the Army National Guard (ARNG) and the Army Reserve (USAR).

The active Army is rapidly dropping in strength and structure from the 1,600,000 men and 19 divisions it had in 1968-69. Also, current trends indicate that the Army will have fewer active Army soldiers overseas in the future. Because of these factors a greater degree of reliance will be placed on the Reserve Components. Every effort is now being made to step up

training of Reserve Component units and to improve their capability to respond to new contingency missions.

Equipment

A key factor in improved readiness is training equipment. In the past there have been shortages of equipment available to the Reserve Components. Some units have not had enough equipment to initiate training, let alone obtain the desired level of readiness. At today's prices it would take about $4 billion worth of equipment to properly train all Reserve Component units. Currently, there is about $2½ billion in equipment onhand. To further darken the picture, $1 billion of this is contingency and training equipment which is not satisfactory for use in combat; therefore, it would take about $2 to $2½ billion to provide enough deployable equipment to the Reserve Components just to give them the capability of conducting meaningful training.

Although this dismal situation has existed for a number of years, relief is now in sight. With the slowdown in the war some of the equipment that was going to Vietnam can now be issued to the Reserve Components. For example, in 1970 Reserve Component units were issued $300 million worth of equipment. This is more than double the amount received in any recent year. When final totals are counted it appears that more than $600 million worth will have been received during 1971. In 1972 and beyond the quantity of equipment provided to the Reserve Components should be even greater.

Airmobile Capability

It is most desirable to have an Army with as complete an airmobile capability as possible within the constraints of budget and manpower resources available. Consequently, in July 1970 General William C. Westmoreland, Army Chief of Staff, approved a Reserve Components plan that will result in one-third of the Army's airmobile capability being in the Army National Guard and the Army Reserve.

Aircraft

In July 1970 the Reserve Components had about 900 old, obsolete aircraft. In many cases the aircraft were older than the pilots flying them. Additionally, there were many fixed wing substitutes for rotary wing aircraft. In the last year the situation has been greatly improved. A number of CH-34s, OH-13s, OH-23s, UH-1s, CH-54s, CH-47s and OV-1s have been issued and more are on the way.

Structure

At this time the National Guard and the Army Reserve are converting to G/H series TOEs and concurrently adopting a new aviation structure. By the end of 1971 it is expected that the Reserve Components will have 2 CH-54 Flying Crane companies, 6 CH-47 Chinook companies and 16 assault helicopter companies—5 of the assault companies will be in infantry divisions and the rest will be separate. In addition to these 24 companies, there will be a wide variety of other aviation elements including air ambulance companies and medical evacuation detachments. All told, it is expected that there will be over 2,300 aircraft authorized in Reserve Component units.

Aviation Personnel

To fly these aircraft Reserve units will need over 4,000 aviators; there are now about 3,000 aviators in the units. Since flight training is expensive—it takes about $50,000 to train an aviator—the Reserve Components are recruiting Army aviators who are being released from active duty. This source of aviators reduces strain on the budget and provides pilots who, for the most part, are combat veterans.

As a part of the recruiting program, a team of three officers visited most of the major installations within the Continental United States during 1970 to explain the National Guard and Reserve aviation programs to active Army aviators nearing release. The team spoke to 800 aviators who were scheduled for release from active duty. Of this group 6 said they would not join, 350 said they were definitely going to join and the rest said they were interested. During 1970 and through March of this year 750 Army aviators joined the Reserve Components after their release from active duty. Many units are already filled, however, some still have vacancies for qualified aviators.

Obviously aviators are only part of the story. Rapid improvement in readiness is also directly dependent on enlisted aviation personnel, therefore, the same degree of emphasis is being given to enlistment of experienced enlisted men. Initial indications are that this portion of the recruiting program will also be very successful.

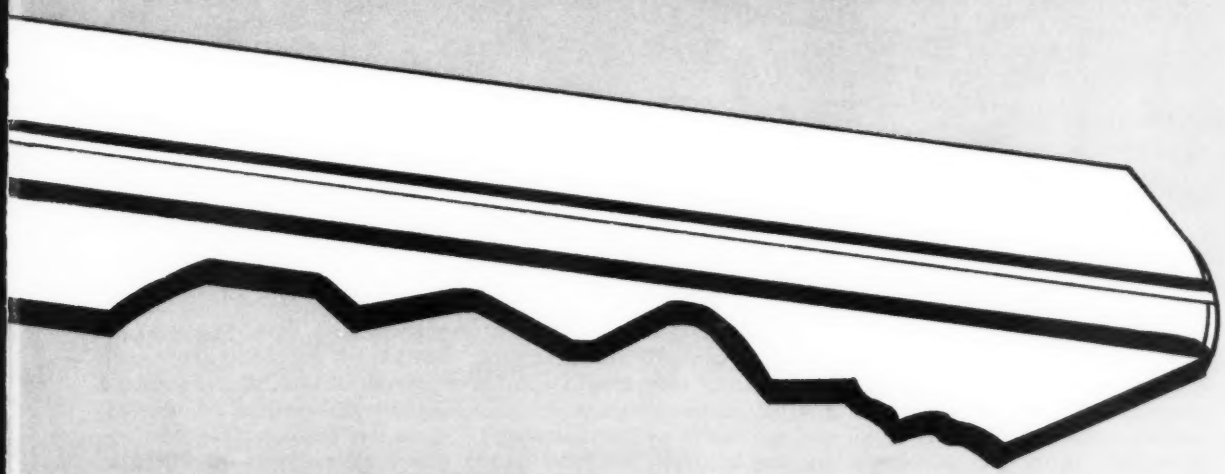
One Army

The Reserve Components have come a long way in the past couple of years, but still have a long way to go to achieve the degree of readiness required. However, with

new equipment being issued and more forecast for issue and with the success of the recruiting program, the goal is now in sight. Aviation unit training should be starting very soon. This training will culminate in the achievement of fully combat ready, immediately deployable aviation units in the Reserve Components. The final objective, of course, is a "One Army" aviation program, not separate active Army, National Guard and Reserve programs. The strength found in its unity will support the Army's airmobile needs for many years to come.

FULL PARTNERS IN DEFENSE

ARMY RESERVE AVIATION

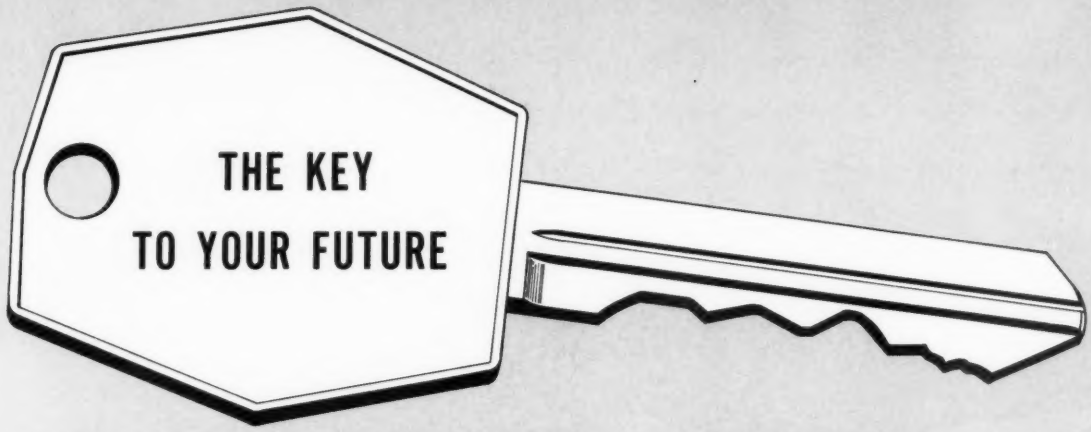


Major General J. Milnor Roberts
Chief, Army Reserve
Department of the Army

Efficiency . . . austerity . . . volar—these words signify the new Army era. The phasedown of the active Army is placing greater emphasis on Army Reserve units to provide necessary support in a wide range of missions. Army Reserve aviation has accepted this increased responsibility and is moving rapidly forward to develop programs of high professional character. This is all part of the Army's attempt to "do more with less." It represents a significant opportunity for prior service aviators to continue their Army careers while the Army also benefits from its huge training investment. The entire program is designed to provide a future "One Army Team"

ARMY AVIATION in the U. S. Army Reserve is currently undergoing a metamorphosis of significant nature. After years of operating with antiquated equipment, severe shortages of aviators and a structure that was not in accord with that of the active Army, the Army Reserve aviation program is emerging to an era of modern equipment, adequate numbers of trained aviators and a structure which is in keeping with the latest Army aviation organizational concepts and doctrine.

Until recently the Army Re-



serve was authorized aviation assets in 123 units with approximately half in the form of aviation sections, detachments or staffs organic to nonaviation units such as training divisions, U. S. Army Reserve commands, artillery groups and other miscellaneous battalion and company size units. The other half of the aviation assets were in 11 "pure" aviation units:

- one headquarters and headquarters company, aviation battalion,
- three brigade aviation companies,
- two corps aviation companies,
- two escort aviation companies,
- one assault aviation company,
- one air ambulance company and
- one air traffic control company.

This structure is now in the process of being revised and units are being converted to the "G&H" series TOE. Much of the change with regard to the pure aviation units is underway; the remainder will be completed by the end of the fiscal year 1972.

Approximately half of the aviation assets will still be in nonaviation units, the same as before; however, the number of such units will be increased from 112 to more than 130. A few units that now have aviation elements will lose them. Other units that do not now have aviation will gain aircraft or aviators or both.

The pure aviation structure will consist of three assault helicopter companies, three assault support helicopter companies, three helicopter ambulance detachments and one air traffic control company. In addition, the brigade aviation companies will be lost and the three Army Reserve brigades will gain aviation sections as part of brigade headquarters and headquarters company.

Modernization of the Reserve aircraft fleet has been started. Until last year the fleet was limited to 123 aircraft—O-1s, U-6s, a YU-9, OH-13s and OH-23s, all of them old, weary and beset with maintenance difficulties. In October of 1970 the infusion of newer types and models of aircraft was initiated with issue of three UH-1s to the 157th Brigade Aviation Company. Input of new aircraft will continue until the end of FY 1973 when the fleet will be enlarged to approximately 400 UH-1s, CH-47s and LOHs. Some of the older models such as the U-10 and U-6 will remain with the Army Reserve for a few more years, but it is hoped that they too will be replaced at some point in the not-too-distant future.

As the Reserve converts to the new structure, the area organizational maintenance shop (AOMS) system will be ex-

panded and organic direct support maintenance capability will be added. This will assure the Reserve of the capability to keep the increased numbers of aircraft in a state of operational readiness.

The Army Reserve aircraft maintenance plan envisions a total of 33 AOMS, which represents a substantial gain from the present 18. This will require approximately 500 fulltime technicians compared to the present 81. These technicians will be in a dual status, filling an Army Reserve aircraft maintenance position in a TOE/TDA unit and also working fulltime as a technician.

Plans are also being made to utilize aviation unit maintenance personnel in the AOMS system during regular unit assembly periods, thus providing valuable training to these personnel and at the same time some maintenance assistance to the AOMS. In addition, AOMS will be used as training vehicles for aircraft maintenance companies.

Although it is planned that most of the direct support aircraft maintenance will be accomplished in Army Reserve units and facilities, active Army activities will continue to provide general support and depot aircraft maintenance.

As the Reserve aviation structure is revised, so also is the aviator authorization. Under the previous structure 744 aviators were authorized in Army Reserve TOE/TDA units. To accommodate aviators who were rotated to nonaviation assignments for career development and limited numbers of Individual Ready Reserve aviators, a maximum of 372 additional aviators could be retained on flight status. As of this writing 831 aviators are authorized in Army Reserve TOE/TDA units with a final authorization of 875 projected when structure changes are complete. With the additional authorization for flight status for aviators in nonaviation positions, and those in the Individual Ready Reserve, the Army Reserve aviation program of the near future will accommodate 1,313 aviators on flight status.

Aviator shortages that have plagued the Reserve over the past decade are being eliminated. This is being accomplished by recruiting prior service aviators and by recruiting personnel for initial entry training. Personal and letter contact is constantly being made with aviators recently released from active duty to interest them in keeping active in aviation by joining an Army Reserve unit. This allows the prior service aviator to continue his career with Army aviation while, at the same time, the Army is benefiting from its training investment.

Additional incentive for recruiting aviators was provided in November of last year when 24 additional paid flight training periods were authorized for Army Reserve aviators and crew members assigned to TOE/TDA positions. This authorization also provided for increased individual proficiency as well as the capability for more unit training.

The results of these recruiting efforts have been gratifying. On 15 March 1971 the Army Reserve had 711 aviators on flight status or assigned with flight status orders pending.

It is fully expected that by the end of this year with continued recruiting the Army Reserve will achieve the objective of full aviator strength in TOE/TDA unit aviation positions.

This new posture will increase the efficiency of training and support operations involving Army aviation. In the past the capability to conduct unit aviation training and to support field exercises of aviation and nonaviation troop program units was severely limited by the lack of aircraft and the fact that those on hand were not suitable for such exercises. The Reserve will now be able to participate much more fully in this type of joint training since the equipment and personnel will be available to support it. This will have a tremendous impact upon the morale and readiness of both Reserve aviators and the Army Reserve as a whole.

Another development closely related to this can also be foreseen. The Army Reserve aviation program will play a growing role in mutual support operations with the active Army and other components. Reserve aviation units will be capable of furnishing support to the active Army to include training exercises, large scale maneuvers and a wide range of missions to satisfy transport, air delivery, courier and other day-to-day aviation requirements.

The Army Reserve is moving ahead rapidly into a full-fledged modern aviation program. It will be a program of high professional character which will enable achievement and maintenance of the highest standards of operational readiness. Army aviation units will play a key role in the Army's ability to "do more with less" as it strives to meet its commitments in an austere budget situation. The active Army phasedown, while releasing equipment and aviators to the Reserve, will also bring with it increased responsibilities to achieve and maintain a readiness posture required not only for mobilization but also in day-to-day service on the "One Army Team."

Charlie and Danny's Write-In

Dear Danny: We have been discussing power limitations on the TH-13. Chapter 7 of the dash 10 has us confused. Would you set us straight?

CW2 Jug

Danny's answer: Glad to. A change to chapter 7, paragraph 7-12 of TM 55-1520-226-10 is in the mill but you need not wait to use this information. Takeoff power is limited to a 5-minute duration at 270 horsepower with a maximum continuous power of 220 hp 26.7 inches Hg MAP sea level to 20,000 feet. For example, you may use 270 hp for 5 minutes. If at the end of that time you still require the use of power above 220 hp, you must reduce to 220 hp momentarily—then you may increase power up to 270 hp for another 5 minutes. There is no limit as to how many times you may do this but—do not exceed oil or cylinder temperature limits at any time. To avoid confusion, paragraph 7-12b on page 7-4 of the dash 10 will be deleted on the change.

Dear Danny: Recently while reviewing weight and balance procedures on the U-21A I came across this stopper which is causing me some concern. Refer to TM 55-1510-209-10/1, chapter 12, section IV, page 12-10. What is the significance of the stain-stepped lines starting at 7,400 pounds, listing percent of MAC and moment? I have been told by others that this is a precautionary area and moments falling within these parameters should be used only in an emergency. What do you say?

CPT M.M.C.

Danny's answer: Good question M.M.C. and here's what we say. The forward CG limit is 12.3 percent MAC for all weights below 7,400 pounds then tapers to 23.2 percent MAC at 9,650 pounds. The aircraft CG limits for all weights is 32.5 percent MAC, therefore, any total moments falling within the stain-stepped lines you refer to are within the CG limits and can be used safely. If a flight is started with the percent MAC falling between these lines may we suggest checking the landing CG limits very closely, especially during a low fuel load condition.

Dear Danny: While thumbing through the U-1A Pilot's Handbook, TM 55-1510-205-10, I noticed the manual has it down that the cylinder head temperature gauge thermocouple is located under the rear spark plug of number 1 cylinder. But in my TM 55-1510-205-20 it says the thermocouple is on the rear of number 2 cylinder. I think the dash 10 is incorrect and should be corrected.

SSG V. R.

Danny's answer: You are correct Sarg, the dash 10 is in error. The thermocouple should be located under the rear spark plug of number 2 cylinder when the P&W engine R1340-59 or 61 is installed on the U-1A. This connection should appear in

INSTRUMENT CORNER

ARE WE ALL speaking the same language? What do the following words mean to you while flying IFR?

• *Cruise*—a word used instead of the word "maintain" in an ATC clearance to indicate to a pilot that climb to and descent from the assigned altitude may be made at his discretion, and is authorization for the pilot to proceed to and make an approach at the destination airport. Reference DOD FLIP, section I, page 1-13, dated 1 Sep 70.

• *Radar contact*—the term air traffic controllers use to indicate that an aircraft is identified on the radar display and that radar service can be provided until radar identification is lost or radar service is terminated, and that when the aircraft is informed of "radar contact" it automatically discontinues reporting over compulsory reporting points. Reference DOD FLIP, section I, page 1-16, dated 1 Sep 70.

• *Straight-in approach*—an instrument approach wherein final approach is begun without first having executed a procedure turn. Reference DOD FLIP, section I, page 1-16, dated 1 Sep 70.

Have any questions for the Instrument Corner? Send them to Editor, U. S. ARMY AVIATION DIGEST; ATTN: Instrument Corner; Department of NRI; U. S. Army Aviation School; Fort Rucker, Alabama 36360.

Change 1 when published.

Dear Danny: In researching the AH-1G operator's manual I find that the pilot's reflex sight is called the XM-73, but I can't find the nomenclature for the sight at the gunner's sighting station. Can you help me?

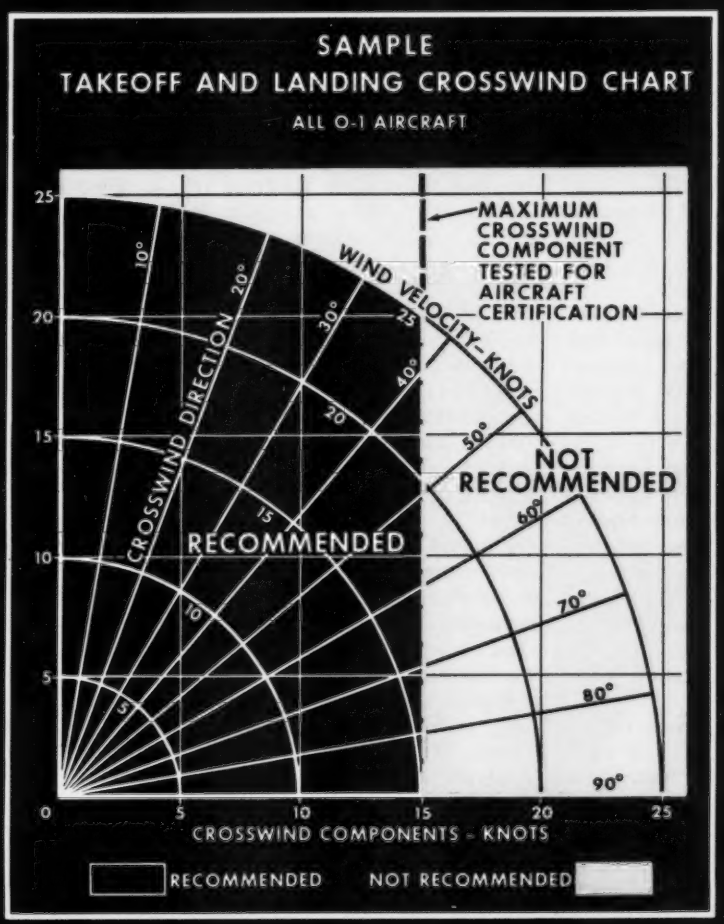
CPT G. A. H.

Danny's answer: According to U. S. Army Weapons Command, Frankford Arsenal, Philadelphia, Pa., the correct nomenclature for that station is: sighting station, aircraft turret XM-28. We'll see that the dash 10 reflects this information in the future.

Dear Danny: Please clarify how to read the O-1 takeoff and landing chart, figure 14-3A, page 14-4A, TM 1510-202-10. It shows a maximum headwind of 20 knots and a maximum of 24 knots for a 35-degree crosswind, both are within the recommended area on the chart. This does not seem to be valid inasmuch that you could take off and land with a higher crosswind than headwind.

CPT R.G.D.

Danny's answer: Right you are, Captain, the chart you refer to does indicate that you could take off or land with a stronger crosswind from 35 degrees than would be permissible with a direct headwind. A publication change request has been submitted to USAAVSCOM to correct this error and the new chart should look something like this.



Our Backbone of Defense

RESERVE COMPONENT AVIATION

Major Gerald E. Lethcoe Jr.

GETTING OUT SOON? If commercial aviation doesn't appeal to you or won't fit in with your future plans, don't hang up your wings without thinking about this. The same joys of flying plus some extra money may be yours if you sign with a National Guard or Reserve unit. It may be that you have already considered this as a possible course of action but discarded it for various reasons. As a gunship pilot the thought of an OH-13T might not have coincided with your idea of good flying, or if you were crew chief on a Chinook, you might not have been enthralled with the mental picture of bouncing around the skies in a CH-37. But your past impressions are rapidly losing validity.

It is true that in recent years Reserve Components have had to operate with a small number of obsolete aircraft and the resulting low personnel fill. If this is all you've heard, it's no wonder that the picture of Reserve or National Guard units appears to be something less than bright. But a change is in the making. No longer will these units have to labor under such handicaps. Reserve Component aviation is now on the upward swing with an indepth modernization program.

Within the past year issues have included the OV-1 Mohawk, UH-1 Huey, CH-47 Chinook and CH-54 Tarhe. Also, a large number of CH-34 helicopters have been added to the inventory; however, these will probably be phased out as additional Hueys are issued. Future issues will include more of the previously mentioned aircraft plus U-8 airplanes, gunships and OH-6/OH-58 helicopters, culminating in issue of full TOE authorizations within the next 2½ years. As a result of the issue of these aircraft to over 280 units authorized aircraft, every state in the nation will have some Reserve Component aircraft within it.

The issue of first line aircraft and the need for an unusually high degree of readiness in aviation units prompted the initiation of a special Reserve Component aviation recruiting program in March 1970. This program is geared to encouraging aviation personnel leaving active duty to affiliate with a Guard or Reserve unit. This was not an attempt by the Reserve Components to lure the active Army aviator, but to urge him to seriously consider the benefits of Reserve Component aviation duty and his continued contributions to the defense of the nation upon separation.

Benefits to the individual are both immediate and long range in nature. Benefits realized immediately would not only provide supplementary monthly income but also enable continued association with Army aviation while pursuing a civilian career. There are many variables involved when computing pay, but in general a married captain who is rated and has over 4 years active service can supplement his income about $2,800 annually.

Long range benefits include continued promotions and a sizable retirement income. A CW3 with 22 years of active and Reserve Component duty could receive over $200 per month after age 60. An E-8 with 26 years of active and Reserve Component duty could also receive approximately $200 per month after age 60, depending on retirement points earned.

Now if the mental picture has changed and you would like to know more about the Reserve Components, follow these guidelines.

You may apply for a position in either a unit of the Army National Guard or of the Army Reserve. Here's how and when:

Before being released from active duty, contact the Reserve Component aviation recruiting program project officer at your location. He will normally be an aviator himself. His office will probably be with either the G-1 or the Director of Personnel and Community Affairs. After the interview you should begin to compile your records and initiate a request for assignment to a Reserve Component unit. Your personnel section should be able to assist with the administrative details. To expedite matters, if you are planning to join a Guard unit forward a copy of DA Form 23-76 (Notification to the State Adjutant General of Release From Active Duty) to the Adjutant General of the state in which the selected unit is located. It would be advisable to make a true copy of DA Form 23-76 and maintain this with

Don't Hang 'em Up

National Guard and Reserve units offer exciting, new aviation opportunities

your personal 201 file. You also will need a current Class II flight physical, DD Form 214 (Armed Forces of the U. S. Report of Transfer or Discharge) and a copy of your original rating order along with your flight records.

If the only questions that linger in your mind are "Where are the units located?" and "Will it be as simple and convenient as it sounds?" write to the Editor, U. S. ARMY AVIATION DIGEST, Fort Rucker, Alabama 36360. He will forward to you a list of Army Reserve and National Guard aviation units in your state, along with a list of their authorized equipment and slots. Interested? Do it, write now.

Second Lieutenant Ronald M. Graham
Delaware Army National Guard

First [illegible]

Flight training is only the first step in becoming an aviator with a National Guard unit. Many tedious but rewarding hours of work lie ahead for professionalism pervades a period of training to polish those newly acquired techniques

HAVING COMPLETED the initial phases of Army flight training, the newly designated Army National Guard aviator is, of course, justifiably proud of his considerable accomplishment. He is confident of his ability to handle any of the myriad maneuvers and missions he encountered in the 9-month training period he has just completed.

Now for the question of what awaits our new aviator in his first assignment in a National Guard aviation unit. If the situation he is confronted with is similar to that in Delaware, he finds himself on a facility such as Greater Wilmington Airport which handles no less than 600 general, commercial and military flights daily, ranging in type from a civilian student's first solo to a DC-8 shooting ILS approaches.

Since our aviator will no longer be flying under the control of a military tower, he need now be concerned with the civilian tower facility and the flight service stations in the local flying area. In all probability he will also be transitioned into an aircraft in which he has no flying time.

If all of this is not enough to occupy the hours of his first weekend drill, there are always the National Guard regulations governing aviation and local policies to be learned.

In anticipation of the arrival of newly designated aviators, the National Guard aviation support facility commander has prepared a well-organized transition training program utilizing additional flying training periods and equivalent training for unit assemblies conducted in the previous 60 days.

The program must be flexible enough to be implemented in such a way as to permit the aviator to return to his civilian occupation as quickly as possible.

In the initial briefing the training syllabus is outlined along with a description of the mission of the aviation support facilities. Throughout the training period a "safety first" policy is repeatedly stressed. After a get-acquainted flight, the new aviator embarks on a study program adequate in length to familiarize him with appropriate Army National Guard and FAA regulations, as well as local flying policies. At all times during this study period experienced members of the support facility are available for questioning or general discussion. After familiarization with the regulations has been accomplished, flight planning is explained and practiced in conjunction with sectionals and descriptions of the local flying area.

Of course, maintenance is an important part of any flying program and in this area several hours are devoted to acquainting the aviator with maintenance personnel and procedures to preclude the possibility of any misunderstandings that could otherwise arise. During this phase discussion of the maintenance library and technical manuals is helpful preparation for a comprehensive operator's manual examination which is administered at some time prior to the completion of the training program.

To take advantage of the first weather day a tour of the airport, including the control tower and weather reporting facilities, was arranged. While on this tour the new aviator meets the people upon whom he will rely for many vital services.

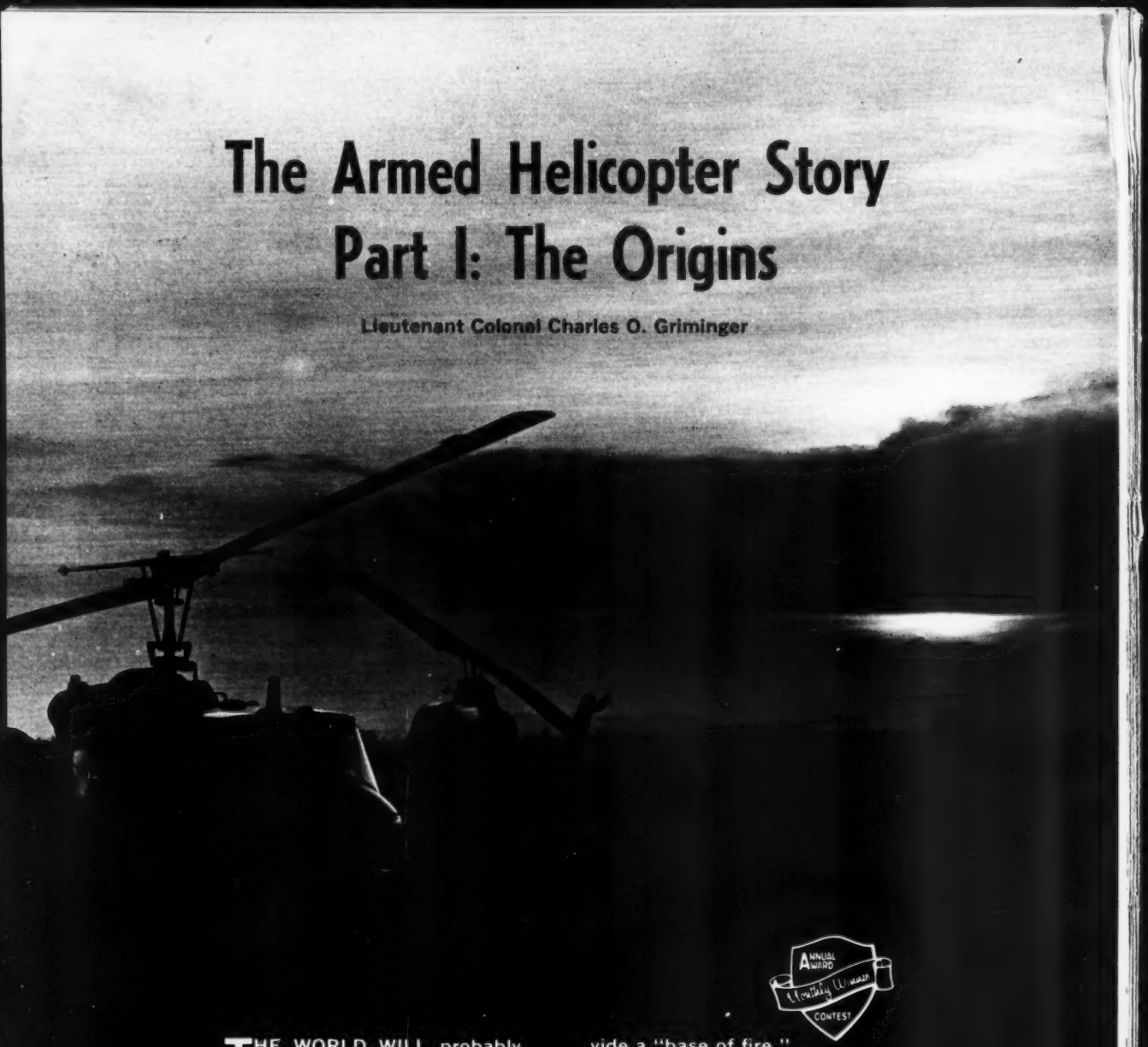
During all of these phases there are flight training periods, or perhaps they could more accurately be described as flight evaluation rides. Each maneuver taught in flight school is demonstrated to an instructor pilot (IP), who in turn makes suggestions to improve the technique of the new aviator. In total the flight portion of the transition training covers 25 hours, at least 12 of which is with the IP. Dual time may be extended by the IP or upon request from the new aviator who may wish to improve his skills or learn new maneuvers. The checkride, which is a prerequisite to the aviator being cleared for operational flights, may extend over several flying periods or even several weeks. Each flight maneuver is formally graded by the IP.

In addition to the formal training periods provided, much can be learned from the more experienced aviators who have come into the Delaware unit from the active Army, Navy, Air Force and Marine Corps.

Generally the new aviator soon learns he has not finished his aviation education, but with graduation from flight school has just reached the first plateau.

The Armed Helicopter Story Part I: The Origins

Lieutenant Colonel Charles O. Griminger



THE WORLD WILL probably never know who first armed a helicopter. The French laid claim to having the world's first armed helicopter in the mid-1950s during a battle in Algeria. An enterprising French unit commander decided to arm a helicopter when his troops were pinned down by rebel fire from a hillside above his position. Darkness was nearing, and he couldn't get his ground troops into a position where they could provide a "base of fire."

The commander elected to strap a man with an automatic rifle on each of the two litters attached to the sides of an observation helicopter. The rebels were routed by fire from the helicopter and the French unit occupied its objective that night.

The French helicopter certainly wasn't the first to be armed. It may have been the first fired in combat, but this also is unproven.

The Army planned for arming Sikorsky's R-5s in the early 1940s with a 20 millimeter gun in the nose

Interest in arming helicopters began as early as 1940 with Sikorsky's development of the R-5 helicopter. In 1942 the U. S. Army studied the design of a 20 millimeter cannon installation in the nose of the R-5, but this program was dropped with the creation of a separate U. S. Air Force in 1947. The British purchased Sikorsky's R-5s in 1942 with the idea of equipping them with radar and depth charges and placing them aboard merchant vessels to provide protection from submarines. The Germans also considered the use of helicopters as convoy protectors and deployed KL-281s, the Flettner synchrocopter, with convoys. The U. S. Navy made an evaluation of the helicopter as a weapons platform in 1945 to drop torpedoes and depth charges, but the project was abandoned at the end of the war. In 1950 the U. S. Army and Bell Helicopter Company experimented with mounting a bazooka on an OH-13 helicopter and the U. S. Marine Corps conducted tests using the helicopter as a weapons platform around 1951. However, on the whole there was not a great deal of high level support available to armed helicopter advocates.

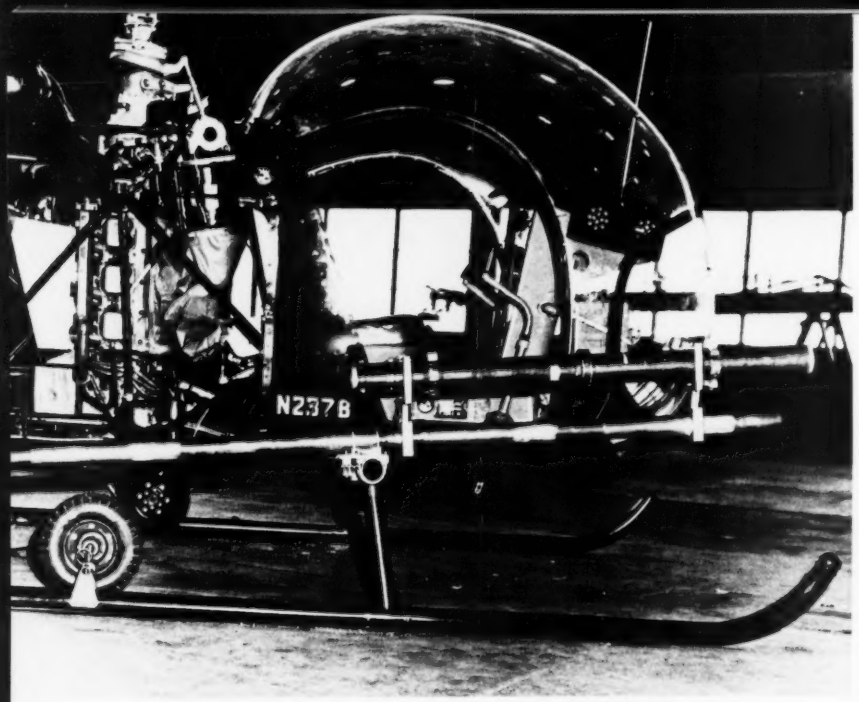
The first armed helicopter in combat was probably devised during the Korean War when the helicopter received its baptism of fire in the early 1950s. Aviators are known to have fired their weapons from the open doors of helicopters. These were not the first attempts to arm helicopters, but they reflect the spirit behind the armed helicopter's evolution.

The Army's need for a suppressive fire system for helicopters became apparent when it deployed UH-19s in Korea in 1952. Interest waned somewhat with the end of the war, but their potential remained in the minds of many.

In 1953 the 24th Infantry Division in Japan experimented with a makeshift grenade launcher mounted on an OH-13. At about the same time the French found a need in Algeria to experiment with machine guns mounted in the doors of helicopters. In the United States the Ballistics Research Laboratory, Aberdeen Proving Ground, Md., equipped a YH-32A with launcher tubes for 2-inch rockets. The project, known as "Sally Rand," was designed to determine the potential of a stripped-down helicopter in an armed role. Tests were conducted using 5-foot tubes which produced a dispersion from 8 to 14 mils, and then with 10-foot tubes which resulted in a 4 to 8 mils dispersion. This helicopter never became part of the Army's inventory.

A sky cavalry experiment was included in Exercise "Sagebrush" in 1955. The afteraction report was written by nonaviation evaluators and turned out to be unfavorable. Thus, the armed helicopter received a setback. Discouraged by these events Brigadier General Carl I. Hutton, commandant of the U. S. Army Aviation School at Ft. Rucker, Ala., and a believer in the future of the armed helicopters, took the matter into his own hands and started experiments.

Thus, the real development of helicopter armament systems had its beginning in 1956 at Ft. Rucker. In June GEN Hutton asked Colonel Jay D. Vanderpool to take on a spe-



Left: Bell Helicopter and the Army experimented with mounting a bazooka on an OH-13 Sioux in 1950. Below: The 24th Infantry Division experimented with this makeshift grenade launcher on an OH-13 in Japan in 1953. Right: Project "Sally Rand" equipped this Hiller YH-32A with launcher tubes for 2-inch rockets to determine the potential of a stripped down armed helicopter

cial project. This special project was the fabrication and testing of weapons systems to be used on Army helicopters. COL Vanderpool was assigned to and later became Director of the Combat Developments Office which was attached to the aviation school. (This organization later was to become the U. S. Army Combat Developments Command Aviation Agency.)

GEN Hutton, who many consider to be the "father of the armed helicopter," began the helicopter armament experiments without the approval of his superiors for a fear, based on previous experience, that the project would not be approved. He foresaw the use of the helicopter as a means to increase the mobility of the ground soldier, and the need for the helicopter to have a ground fire suppression capability during airmobile assaults. He felt if the enemy could be made to keep his head down, his fire would not be nearly so strong and accurate as when the helicopter could not return the fire. He

envisioned helicopters designed strictly as weapons systems.

GEN Hutton, now deceased, commanded the aviation school from June 1954 until June 1957 when he departed for an assignment in Europe. There he became involved with the development of the armed helicopter for Seventh Army. He was followed as commandant of the aviation school by Major General Bogardus S. Cairns from June 1957 to December 1958, and by Major General Ernest F. Easterbrook from June 1959 to March 1961. Both of these generals continued to energetically pursue the work GEN Hutton had started, following it through to the successful development of helicopter systems.

COL Vanderpool, now retired, wasn't an aviator but had formed previous ideas about arming helicopters in World War II and Korea. He accepted GEN Hutton's challenge with much enthusiasm and began work immediately. COL Vanderpool started with weapons left over from the ill-fated projects "Able Buster" and "Baker Buster" which evaluated armed light aircraft as tank killers. The men he gathered were dedicated, ingenious and imaginative experimentors. Hampered by the lack of funds, facilities and even official encouragement, they developed the prototypes for a new family of weapons and established doctrine for their employment. Their achievements were truly remarkable considering they developed these systems without formal research and development or evaluation assistance. GEN Hutton's enthusiasm was demonstrated by his weekend and evening presence at armament work and test sessions.

In January 1956 GEN Hutton's chance came to get his foot in the U. S. Army Continental Army Command's (USCONARC) commanding general's door. USCONARC published Training Memorandum Number 13, dated 4 June 1956. This memorandum emphasized the need for new concepts in mobility and flexible organization, and tasked commanders with conducting experimentation in these areas. GEN Hutton wrote a letter to General W. G. Wyman, commanding general, USCONARC, on 27 June 1959 stating that his solution to the mobility problem was to put the ground soldier into aerial vehicles.

GEN Hutton also recommended that industry be tasked with the development of a fighting aerial vehicle. In the same letter he asked for permission to experiment with existing helicopters organized into tactical formations in order to run problems similar to the ones outlined in Training Memorandum Number 13.

In a letter of 13 July 1956 GEN Wyman approved the request and asked that a broad plan be coordinated with the U. S. Army Infantry School at Ft. Benning, Ga., and be submitted to him. It was with this spark of encouragement that the forging of the U. S. Army's current airmobile units began. (Next month—Part II, "Vanderpool's Fools")

Maintenance

. . . SO KEEP YOUR EYES OPEN FOR ALL THAT DOES NOT BELONG

Difficulty breathing?

Prevention Of Contamination: Do not use tape to seal fuel or oil openings. Some tape adhesive is soluble in fuel or oil and can readily cause contamination of the fuel or oil. (Reference: TM 55-1520-218-20, change 5, section II, paragraph 5-24)

ARC-54 Transmitter: In Vietnam we experienced many difficulties with our ARC-54 transmitters becoming inoperative. We found that the cause of this was moisture getting into them overnight. Solution was to let the radio warm up for several minutes before transmitting.

FOD Again! Turbine engine FOD is a nasty word with most maintenance and crew personnel. Sometimes it is a subject that has been overplayed and sometimes we are just plain tired of hearing about FOD.

In most cases FOD is an unnecessary waste of many manhours. Many aviation companies fail to maintain a high standard of aircraft availability because of FOD. Worst of all is the injuries and death to crew members because of power loss or engine failure caused by FOD.

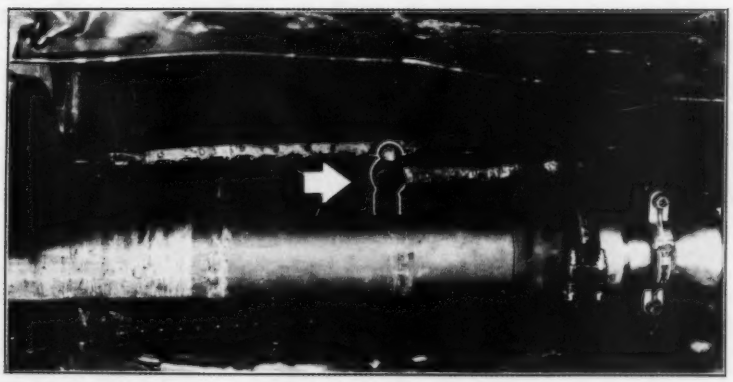
With the large turnover of men, both aviators and maintenance personnel, it behooves all career personnel to continually educate newly assigned personnel and establish control measures to reduce and eliminate FOD.

During a periodic inspection turbine engines are inspected for FOD; if FOD is present the engine is repaired or replaced. The problem normally occurs during the 100-hour period while the aircraft is being flown between periodic inspections. The pilot, using the applicable dash 10 operator's manual to preflight his aircraft, receives little or no guidance on how to detect FOD. Usually the only check he performs is to ensure that the engine air intake is clean and free from obstruction. While the aircraft is on the ground is the time to determine if FOD is present; don't wait until during flight when it can show up through loss of power or an engine failure.

Wise commanders and maintenance officers who want their units to be the best will never achieve their goals without establishing standard operating procedures to detect and eliminate FOD. The key to preventing engine FOD is the informed aircraft commander and crew chief because of their daily contact with the aircraft.

How many death certificates from aircraft accidents in just the past few years should have indicated cause of death FOD?

Matters...



Would you believe?

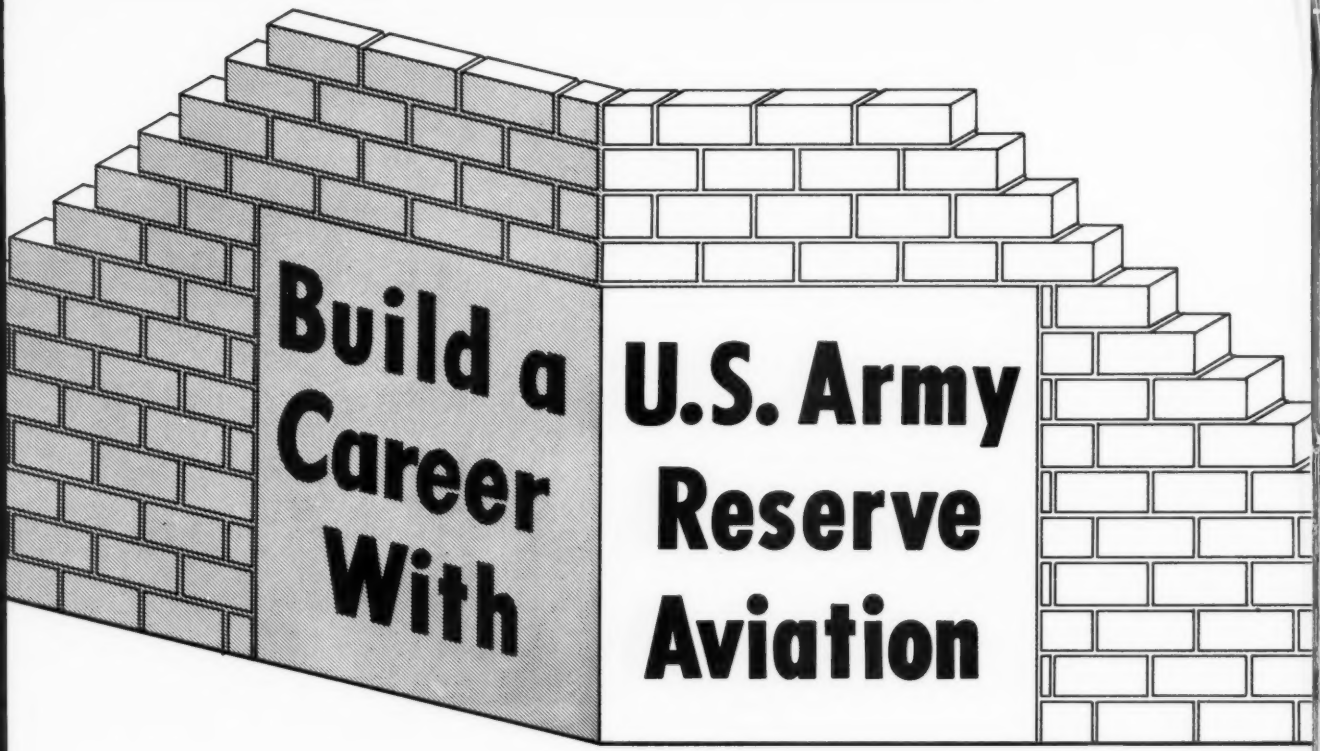
Read That TM Thoroughly: When performing maintenance always check for CAUTION and WARNING blocks in the TM you are using. Remember, sometimes these important blocks are located at the end of the section. By knowing what is in these blocks can help prevent accidental damage to the item or part being worked on.

Troubleshooting The Aircraft D.C. Generator Circuit: A problem which usually causes a great deal of colorful adjectives and unnecessary changing of components is failure of the D.C. generator circuit. The mind of the maintenance technician and the drain on the supply system can usually be eased by the following simple check at the mysterious gadget known as the reverse current relay (RCR):

- On a properly functioning generator system all terminals on the RCR will indicate 28 volts when tested.
- If 2 to 4 volts are indicated at the "Gen" terminal of the RCR, the problem is in the shunt field circuit. This circuit begins at the Gen terminal, passes through the voltage regulator and re-enters the generator on terminal "A."
- If zero volts are indicated at the Gen terminal, the trouble is in the generator or the main armature lead.
- If 28 volts are indicated on the Gen terminal and zero volts on the "SW" terminal, the trouble is in the switch circuit.
- If 28 volts are indicated at the Gen and SW terminals, all other RCR terminals should also have 28 volts. If this is not the case, the fault lies in the reverse current relay.

Fueling Talk: Fuel control maintenance begins with fueling of the aircraft. Check that the fuel available is the correct type, then make certain that the fuel nozzle is clean. Cover the exposed portion of the filler port on the aircraft. Inspect the inlet filter and the pump discharge and servo filters in accordance with the applicable manuals. Upon completion of fueling wipe off all spilled fuel and replace and secure the filler cap on the aircraft. Doublecheck to make sure that the filler cap has been replaced and secured properly.

Tail Rotor Tip: Caution should be exercised when removing and installing tail rotor drive shafting on the UH-1 series helicopters. Make sure they are placed where they will not get bent or stepped on. Check to ensure that the inserts are not loose and that all balance weights are installed.



Lieutenant Colonel Arthur E. Magary

DURING THE PAST year, concurrent with the phase-down of the Vietnam conflict, increasing attention has been focused upon the U. S. Army Reserve aviation program. We have started realigning our structure to conform to that of the active Army; we are modernizing our aircraft fleet, a process that will be complete by July of 1973; and we are concentrating on bringing our units up to full aviator strength.

What does all of this mean to you? If you are leaving the active Army to settle down in your own community, raise your children there and pursue a civilian career, it can mean a great deal. If you are an Army aviator, it can mean a secondary career in the Army Reserve—a career that pays off in additional money, retirement benefits and the satisfaction of maintaining contact with the aviation world while continuing to use your talents in the service of your country.

One of the major benefits to be realized from service with the Reserve is retirement at age 60 with an annuity guaranteed for life. By virtue of your active service you have made a sizable investment in your retirement

A strong foundation is the essence of any structure. The U. S. Army Reserve Aviation Components can supply the tools and materials of your trade. You possess the skills. The cornerstone is set; make a wise decision

annuity that can be protected by remaining active in the Reserve until you have attained a minimum of 20 qualifying years of service. Army Reserve retirement annuities are based upon a combination of active and inactive duty service. You will receive 2.5 percent of your base pay at the time of retirement for each year of active duty and an additional percentage for inactive duty training. Thus, if you have 4 years of active duty, you have already established at least 10 percent of your retirement annuity. With credit for active Reserve participation and short tours of active duty for training, at the end of 20 qualifying years of service your annuity at age 60 should be approximately 18 percent of your base pay at the time of retirement. Should you elect to continue beyond 20 years your earned annuity will grow correspondingly.

Age 60 may seem too far in the future to worry about when you are in your twenties. However, those of us who have been around for a while can assure you that the years have a habit of passing rapidly when you are in the process of establishing yourself in a community and raising a family. And, unless you take advantage of your youth to establish security for the so-called golden years, you may realize too late that the ship has sailed without you.

Another point of interest to ponder when considering retirement is the fact that to assure an insurance annuity equal to your Reserve retirement annuity at the same age, you would have to pay in more than $200 a month from age 25 to the date of your retirement.

You should also consider other benefits to accrue from retirement from the Army Reserve. These include station privileges, civilian medical care benefits in which the government pays the major portion of the cost and travel "space available" for you and your dependents on overseas flights operated by the Military Airlift Command.

As you are building for your ultimate retirement, you will be receiving the pay and allowances commensurate to your grade. Army Reserve aviators assigned to TOE/TDA units are authorized 48 paid Reserve duty training assemblies per year plus 24 additional paid flight training periods and 15 days annual training. For each Reserve duty training period, usually of 4 hours duration, you will receive 1 day's base pay plus a day's flight pay, and for the 15 days annual training you will receive full pay and allowances. For a W-2 with over 4 years of service this would amount to more than $2,350 per year, or enough to pay for a medium-priced automobile in 2 years.

The Reserve will give you the opportunity to keep flying and to remain abreast of your contemporaries on active duty. All of the aviators that I have known became aviators because of a desire to fly; rarely have I met one who did not wish to keep on flying. The Reserve is now being issued new aircraft. Soon our inventory will be comprised of LOHs, UH-1s and CH-47s. As a Reserve aviator you will be able to remain current in these aircraft and to keep increasing your proficiency as an aviator. As a matter of interest, proficiency requirements for Army Reserve aviators are the same as those for active Army aviators: 80 hours of flying time per year with 20 hours of instrument or hooded flight, 15 hours of night flight and 20 hours of cross-country. Although you do not have to maintain an Army instrument rating, we do encourage it. Additionally, you will be required to successfully complete the annual Army aviation written examination and to maintain Class II flying physical status.

The Reserve aviator who joins an active Reserve unit does not incur any additional obligation other than active participation as long as he belongs to the unit. If conditions are such that it is not possible for him to maintain an active status, he may of his own prerogative be reassigned to the Individual Ready Reserve immediately.

Finally, as an Army Reserve aviator you would be contributing substantially to the defense of the nation. With the phase-down of the active Army, increasing reliance is being placed on the Reserve. To meet the challenge of this responsibility we must maintain a full complement of aviators and keep our aviation elements at a high state of readiness. Your training and experience will assist in fulfilling this mission. Therefore, I urge you to retain this capability in the service of your country by remaining active in the U. S. Army Reserve.

THE AIR MEDICAL EVACUATION SYSTEM CONCEPT

CW2 Robert E. Cline

SUPPOSE FOR a moment you are driving west to California. As you pass through a lonely section of the desert, you see a car spouting steam from a ruptured radiator. It appears to be unoccupied but suspiciously bent and crumpled. As a humanitarian you decide to stop and investigate the possibility of an accident.

You open the door and find the driver slumped over the steering wheel, obviously seriously injured. You remember seeing a town about 20 miles back down the road and a road sign ahead says that it is 30 miles to the nearest town in that direction. Having had a first-aid course you realize it is best not to try to move the injured man, so you make him as comfortable as possible and then drive back to the nearest town to secure help.

It's a long, frustrating drive back and when you phone the hospital you're told the only ambulance is in use but as soon as it is free it will follow you back to the scene of the accident. Finally a 1949 station wagon with beacon pulls up and you are on your way.

Back at the accident sight the patient is extracted and the ambulance races off into the distance. You watch, fearing that it is too late to save the injured motorist.

This fictitious incident is an exaggeration certainly, but it is a fact that similar tragedies do occur every day.

During the last 20 years the number of motor vehicles in the U. S. has tripled from 31,000,000 to 91,000,000. The negative result of this fact is that motor vehicle accidents are the primary cause of accidental death in this country. The loss of life resulting from these accidents exceeds 50,000 persons annually and is expected to increase to about 100,000 per year by 1980. This tragic crippling, loss of life and waste of material resources emphasizes the urgency for the establishment of programs which will reduce accidental deaths. It is this need to which responsible people and governments must respond.

One of the more significant responses has been experimentation with an air medical evacuation system. This air ambulance system is based on facts and figures which have been compiled as a result of two decades of successful medical evacuation procedures employed in combat by the armed forces. The Army's experience indicates that air evacuation of wounded has been the most significant factor in reducing the death rate per hundred wounded from 4.5 in World War II to less than 2.6 in the Republic of Vietnam. In Vietnam 90 percent of the wounded are evacuated by helicopter directly to surgical facilities. Today, civilian agencies are starting to experiment with helicopter medical evacuation systems to see if they are economically sound for their purposes.

A 17-month experiment with helicopters as a 24-hour-a-day vehicle in Lakewood, Calif., led the Los Angeles County sheriff to state, "For rescues and other emergencies . . . there's nothing that can compare with the helicopter. Many people would be dead if it weren't for our helicopters."

In June 1967 members of the engineering faculty and students at Arizona State University initiated a systems analysis study involving the use of helicopters for immediate emergency medical care and transport of motor vehicle accidents to facilities. The analysis resulted in a recommendation for the development of an air medical evacuation system (AMES) to serve with the state of Arizona.

An experiment related to AMES is underway in Nebraska. These experiments promise to expedite treatment even more by bringing the hospital's expertise to the victim almost as soon as he is aboard the helicopter. The key is telemetering signals of the patient's vital functions and bodily condition via transducers and radio to a central computer at a medical center. In 1968 it was stated by Kenneth F. Kimball, M. C. FACS: "Although only 6 months old, Nebraska's Operation Sky-Aid already has established that helicopter and telemetry offer new opportunities for conservation of human life."

Also, in Los Angeles two scientific studies funded by the Department of Transportation's National Highway Safety Bureau will consider the role of helicopters in surveying emergency medical care. A parallel development with these aerial ambulance services is the building of facilities at the hospitals surrounding Los Angeles.

A Michigan commerical ambulance operator, Superior Ambulance Service of Wyandotte, is operating what is believed to be the only commercial helicopter ambulance at cost to the patient comparable to ground service. The service answers an average of 10 calls a week at distances up to 100 miles.

A Nebraska operation just concluded a 1-year test with nominal Department of Transportation funding using UH-19 Army National Guard helicopters.

A combined Ohio State Medical College, National Guard and Highway Patrol operation has made 15 evacuations and rendered air assistance on about 35 calls in 15 months.

In Jacksonville, Fla., the city-county government has signed what is believed to be the first agreement in the nation with the U. S. Navy to utilize Navy helicopters to answer accident calls.

The California Highway Patrol has purchased three Fairchild-Hiller FH-1100 helicopters because of "nearly instant ambulance conversion capability."

Trinity Hospital in Minor, N. D., obtained its own helicopter ambulance in 1969 and has had good results with it.

These are just a few of the many programs now in progress. How successful were they? A spokesman from the Ohio State Medical College operation put it as well as anyone: "If you are willing to accept as a criterion of success that three people are alive today who would not have been without this service, then it's been successful."

How did the cost of air ambulance compare to ground ambulance service? Costs average out to about the same because of the shorter mileages involved flying. In some cases a 100-mile ground route has been shortened to 45 by air. Helicopter operating costs vary according to the make and model of helicopter employed but the rough average cost is estimated around $113.50 per hour.

At this point I would like to leave the facts and figures behind, to some extent, and move in a more subjective line of thought. Let's consider an Army aviator just prior to expiration term of service. On an average he will have between 2 and 4 years of experience and between 1,000 and 2,000 hours of flight time. (Of course these numbers vary to some degree between warrant and commissioned officers.) Considering that military obligation for a U. S. citizen is 6

Left: An operations specialist coordinates a helicopter rescue in a MAST (Military Assistance to Safety and Traffic) program in Texas while a sheriff's patrolman (above) directs an airborne chopper to the accident site

years, this leaves at least 2 years this aviator will be in varying degrees of inactive-active Reserve status. Instead of this I suggest the military obligation be reconstructed so that an Army aviator can stay on active duty in a Reserve Component and with a permanent duty station until his 6-year obligation is met. Of course this should be on a volunteer basis and present rank and pay should be maintained. A similar program for enlisted crew members and maintenance personnel could also follow the above guideline.

These Reserve units, in conjunction with the civil program, could operate an air medical evacuation service that would be high in experience and operational proficiency. This would, of course, cause a revision in the aircraft now available to Reserve units, but I feel the Army could make use of its personnel in which it has invested so much time and money.

Oftentimes, especially in the case of younger Army aviators, a soldier is faced with the problem of having an education and skill in a field for which the civilian world does not have a great market. In times such as we are experiencing today, aviation has little opportunity for a person of rotary wing experience unless that person is willing to relocate continually to follow that job. So, Reserve and National Guard units equipped with suitable aircraft and experienced personnel who volunteer for the job could provide a nucleus for air medical evacuation systems throughout the country. And, it would benefit the Army, Reserve Army aviators and the civilian population.

Aeromedic

Army Aviation Medicine And The Flight Surgeon

America's Reserve and National Guard have long shared the heritage of Army aviation's development and application. More recently they have acquired its more sophisticated aircraft. Have they also acquired the less tangible but very indispensable aeromedical advice and care that has helped optimize Army aviation's mission success in the Southeast Asia conflict?

Major
Nicholas E. Barreca, M. D.

Provided by the Society of U. S. Army Flight Surgeons

IN THE PAST YEAR General William C. Westmoreland, Army Chief of Staff, has repeatedly emphasized the role that Army aviation will play in future Army combat missions. If we are to seriously employ airmobility, particularly in geographical environments distinctively different from Southeast Asia, it must be closely supported aeromedically to a perhaps even greater extent than in the past.

Recently the Army unveiled its experimental triple-capability (TRICAP) division at Ft. Hood, Tex. To what extent will this concept be supported aeromedically? The aeromedical support provided this division should receive the same development and examination as the division itself. Most certainly modern aviation medicine practice can optimize the ultimate effectiveness of such a unit.

Aviation medicine is often mentioned in Army aviation circles, but is frequently misunderstood. Aviation medicine is more than just a doctor cloistered in the sterile atmosphere of a hospital or dispensary. It is a form of medicine that goes to the people it serves and deals with potential and actual medical problems in the perspective of *their* operational environment.

In medical circles aviation medicine (or aerospace medicine as it is generally recognized among the three military services and the civilian sector) is recognized as a specialty. A specialty in medicine is an area that requires additional training in order that it may be practiced precisely, knowledgeably and effectively. Normally this requires formal training beyond medical school and internship in the form of special practical courses of instruction called residencies. In 1953 aviation medicine was officially established as a medical specialty by the American Board of Preventive Medicine, Incorporated. Thus, aviation medicine as a specialty enjoys similar professional status with other specialties of medicine and surgery.

More specifically then, what is unique about the practice of aviation medicine? Basically aviation medicine is the science and art of clinical and preventive medicine as applied to those who serve in the aviation environment. Its ultimate aim is to promote the safety *and* effectiveness of man while he is exposed to the stresses of that unique environment.

In *practice* aviation medicine has many facets:

- It is **preventive** in *concept.* It aims to establish conditions and practices which ultimately reduce the likelihood that an air crewman will ever become a "patient" in the classical sense of the word.
- It is **facilitative** in *direction.* It enables the air crewman to accomplish his mission more easily and safely. It reduces the likelihood of incapacitating or prolonged complications from disease, injury or environmental stress.
- It is **environmental** in *nature.* It accounts for the stresses and limitations of all aspects of the aviation environment. One might this day say it is even *ecological.*
- It is **occupational** in *character.* It examines every medical aspect of the air crewman's job and daily work. This encompasses not only the flying aspect but also the factors that influence healthful, successful and satisfying work conditions.
- It is **military** in *orientation.* It is truly mission oriented. It is partly the means by which that mission is accomplished. It recognizes and embraces the policies, traditional training and discipline of military life.
- Finally, it is **surveillant** and **dynamic** in *application.* It

doesn't stand and wait. It continually surveys, anticipates and acts. It seeks those in need before their self-realization. It investigates and teaches.

Army aviation medicine embraces an *extended* "whole-man" form of medical support. It can thus be envisioned in two phases:

- *Preventive phase*—to promote conditions in the air crewman and his environment that will decrease the likelihood of disease or infirmity.
- *Constructive phase*—to promote the optimum health, well-being and fitness of air crewmen and optimize their efficiency at the man-machine interface.

The first phase is the more conventional or traditional concept of preventive medicine. It includes the use of vaccines or serums to prevent or modify infectious diseases. It includes chemoprophylaxis or the chemical prevention of diseases like malaria. It includes chemotherapy or drug protection against unrecognized early disease such as tuberculosis chemotherapy with isoniazid (INH).

Inherent in this phase is the early recognition of mild as well as potentially severe disorders. By so doing the period of incapacity is reduced and disqualifying complications are averted. A simple cold can be prevented from becoming an ear or sinus block with ultimate complications of infection or rupture of the eardrum. An early diabetic may be controlled by diet. Mild, uncomplicated hypertension may be controlled by diet, exercise and certain low side effect drugs: all this to maximize the longevity and career of the air crewman. Finally, it is the prevention of fatal or seriously incapacitating injury through the design and application of seat belts, shoulder harnesses, boots, Nomex, SPH-4 helmets and oxygen and environmental control systems.

The second phase is an extension of the first. Here, aviation medicine endeavors to maximize the fitness and performance of aviation personnel through the application of preventive principles and biomedical engineering. First, this includes *positive* physical and mental health—the *presence* of optimal productivity and longevity rather than the simple *absence* of disease or disability. This is accomplished by the knowledgeable application of dietary control and physical fitness programs. It encourages recognition of man's psychological needs and strengths. Second, it maximizes efficiency at the man-machine interface through design engineering which is consistent with human physical and psychological capabilities and limitations. This is accomplished through a knowledge of man's physical static and dynamic limitations and capabilities and in addition his intellectual, psychological and physiological capabilities and limitations. Thus, aircraft controls are human factors designed to be consistent and effective.

Aircraft displays are designed to be compatible with man's sensory abilities and their outputs are capable of being integrated usefully by man. Too often man is presented machines by his fellow man that require maximum attention and effort at all times to avert disaster. To a certain extent this is somewhat unrealistic and doomed, if not to failure to marginal performance.

The flight surgeon is specially trained* to recognize and cope with the problems encountered in the aviation environment. Because of certain logistical and administrative aspects of his field, this training is more extensive than is often appreciated.

Such training is not realized by most medical doctors upon graduation from medical school or internship. Thus, the prospective flight surgeon is trained in the areas of:

- The *air crewman's environment*—the aviation hazards of hypoxia, hyperventilation, decompression sickness, trapped gases, acceleration and spatial disorientation. In addition, there are the less specific but equally important aviation-related stresses such as noise, vibration, thermal extremes, visual aquisition and the effects of drugs on flying. The conglomerate of these stresses are then studied in the perspective of acute and chronic skill fatigue. Often it is not the more apparent individual stresses that contribute to man's decreased performance, but rather a subtle and insidious combination of stresses.
- The *air crewman's training*—special medical standards and techniques are required for the selection and maintenance of personnel for the operational aviation environment. The cost of initial training alone ($37,000 to $50,000) for aviators dictates such practice. The requirement for safety is obvious. The flight surgeon must ensure that only the physically fit or qualified enter flight training. He must ensure that they remain qualified throughout their careers. In addition, these principles demand administrative provisions for the aeromedical disposition of flying personnel. The medical flight clearance, medical restriction, suspension and inflight evaluation are such administrative mechanisms.
- The *air crewman's equip-*

*The extent of this training has been the subject of a previous article entitled "The Flight Surgeon" in the August 1969 AVIATION DIGEST.

ment design and *utilization*—this includes protective and life support equipment including the air crewman's protective flying helmets, flame retardant flight suits and gloves, special boots, protective antiballistic vests, retention and escape systems, survival equipment, oxygen systems, cabin pressurization, ear protection and other equipment. It further includes the principles of human factors design engineering and their application to the development of aircraft that are capable of being operated comfortably, efficiently and safely within the confines of man's ability.

Thus the flight surgeon must be well informed and experienced in all the aspects of the man-machine environment complex of interrelationships. In medical school and internship he learns much about the man. It is only through training and experience that he appreciates the machine and the environment. For this reason all flight surgeons are required to participate in *regular* and *frequent* aerial flights. Those who become certified specialists in aviation medicine often undergo limited courses of flight instruction in military fixed and rotary wing aircraft. Since these officers will be ultimately responsible for the conduct of the entire Army aviation medicine program, it is only natural that they have a full appreciation of the inflight requirements of the air crewman. Only through such training and experience can the flight surgeon fully contribute to the research, development and application of improvements in human air crew performance.

The requirement for such extensive medical support in Army aviation is often questioned. Some feel that Army aviation missions and aircraft are not quite sophisticated enough to require this care. The fact of the matter is that Army aircraft and missions have and will become more sophisticated and demanding. The stresses to which Army air crew are exposed equals in number if not extent those of the other flying military services.

For example, just because rotary wing aircraft do not have oxygen systems does not mean the occupants will not be forced to fly under conditions of hypoxia. The exigencies of the combat zone, hostile fire, weather phenomena and geographic constraints eventually force the pilot to utilize the altitude capability of this aircraft at some time. It is the man without adequate equipment and without frequent experience under conditions of hypoxia who needs the comprehensive training and support at some time during his career. If untrained he will hazard the environment without the benefit of knowing the true extent of the risk he takes or the nature of his limitations. He will also have little occasion to learn by experience. One experience may be his last.

Another area that has increased the requirement for knowledgeable aeromedical support is that of instrument flying. In Southeast Asia the Army has learned the limitations of a tactical instrument ticket. It is realized that more training and experience is required to avoid the problems of disorientation. With the prospects for continued and increased IFR flight within Army missions, the requirement for physiologic aeromedical education, training and support becomes ever more defined.

The preventable death of an air crewman in a $100,000 aircraft is as real as that of a pilot who is killed in a "sophisticated" multimillion dollar vehicle. Similarly medical problems, be they physiologic or psychologic, do not begin at some arbitrary altitude or air speed but rather the moment the aircraft becomes airborne or even at the moment the aviator enters its confines. A cost benefit analysis of the value of comprehensive aeromedical support must reflect our desire to prevent the loss of even one human life. The dollar savings for this is unestimable. When dealing with physiologic or psychologic variables, the benefits are frequently intangible or not easily quantifiable, but we must nevertheless always err on the side of safety. In addition, the increase in human performance and efficiency realized by having man account for his limitations or knowledgeably extend his capabilities are immeasurable. The benefits accrued will not only enhance flying safety but also ensure optimal mission accomplishment.

In a recent issue of ARMY AVIATION (October 1970) Brigadier General William J. Maddox Jr. urged all of us in aviation to attack the tasks of the 1970s by:

- Reappraising our recent lessons and consolidating gains.
- Training to improve our skills.
- Being safe, professional and dedicated.
- Ensuring progress through technology.
- Accomplishing the tasks bypassed during the wartime buildup.
- Taking care of our people.

No better recommendations could be made to all of us in Army aviation medicine. The time has come for aeromedical support to improve and expand. All of us in Army aviation must take the initiative to ensure the health, safety and maximum performance of all Army air crewmen.

THE ARNG AVIATION STORY

Lieutenant Colonel Charles R. Jones

THE ARMY National Guard (ARNG) structure now consists of 8 combat divisions, 28 brigade level organizations, 70 group headquarters, 163 battalions, 128 battalion headquarters units and other supporting units. Total ARNG budgetary strength is 400,000 while actual strength is 404,750. The ARNG has 3,052 units of which 2 are aviation groups, 12 are aviation battalion headquarters, 53 are aviation companies and 131 other units have aviation sections.

The majority of Army Guard aviators received their wings from active Army schools; a small percentage are former Navy, Air Force or Marine Corps pilots. Five hundred thirteen combat experienced prior-active-duty aviators joined ARNG during 1970.

ARNG pilots are probably qualified in more aircraft than their active duty counterpart due to diversified types of aircraft in the Guard. The Guard aviator

meets the same requirement as do active duty pilots in flying time, annual written examination and annual physical examination. He has more rigid flight requirements for aircraft currency in that he is required to fly a minimum of 1 hour and make at least five landings each month in each aircraft in which he is maintaining currency, regardless how many hours he has in the craft. The ARNG aviator participates in 48 unit training assemblies and 15 days annual training, as well as performing 24 additional flying training periods during a training year.

Authorization for aviators in the ARNG totals 3,412. Onboard are 1,239 rotary wing aviators, 313 fixed wing aviators and 1,005 dual qualified for a total strength as of 31 March 1971 of 2,557 aviators. This is an increase of 685 aviators in calendar year 1970. In July 1969 initial flight training was reopened to the ARNG. Of even greater importance, the Guard is enjoying tremendous success at recruiting active Army aviator returnees. As mentioned earlier, the ARNG has a variety of aircraft, mostly substitutes for authorized equipment. Total aircraft authorized is 2,220 with 944 total onhand as of 31 December 1970.

The Guard received its first OV-1 Mohawks 28 January 1970 in Georgia and a number of these are now flying regularly in the Georgia ARNG. The CH-54 Flying Crane is in the inventory in heavy helicopter units in Kansas and Alabama. The delivery of UH-1 Hueys began last October and will continue through FY 73.

Aircraft on the near horizon for the ARNG include the OH-6 Cayuse, OH-58 Kiowa, CH-47 Chinook and U-10 Helio Courier. The overall plan is to have modern TOE aircraft in selected priority units in FY 72 and all units have *full* training requirement by FY 73.

The foundation for the Guard's accident prevention program and for management of aviation resources is the fulltime Guardsman-technician program. Each state has an Army aviation support facility and an Army aviation flight activity for larger states. These are located at central airfields to provide supervision of flying and supervision of the aircraft maintenance program.

The Guard has eliminated what some like to call "cow pasture flying" where aircraft were farmed out to outlying units for periods of time with little or no supervision of aviator activity and no supervision of aircraft maintenance. This close supervision of fixed base facilities enhances the Guard's capability to support the ground commander with aviation. The major aviation unit or units are usually colocated with the facility. Aircraft assigned units of the state are located and maintained at these facilities. The fulltime airfield commander, a Guardsman, is assisted in standardization, safety and maintenance by other fulltime Guardsmen.

Instructor pilots are authorized based on aviator density, while aircraft maintenance personnel are authorized according to type and number of aircraft. Operation and training are the responsibility of the aviation unit commander. Supervision and support are provided by Guard fulltime fixed base operations. The Guard has three transportation aviation repair shops. These shops are located at Groton, Conn.; Springfield, Mo.; and Fresno, Calif., and accomplish aircraft maintenance on active Army, ARNG and USAR aircraft as satellite shops to New Cumberland, Red River and Sharpe Army Depots. The shops pay their own way with low cost maintenance production and, at the same time, provide deployable general support aviation maintenance battalions for the active Army.

Another advantage of the facility/activity system, particularly with the Guard's current inventory of aircraft, is better utilization of equipment: unit training, support missions and AFTP flying. The National Guard is assigned, by law, a dual mission. Its State mission is to provide in its inactive duty status, units organized, trained and equipped to provide for the protection of life and property under the command of the state. Its Federal mission is to provide units organized, trained and equipped to meet the wartime requirements of the Federal government.

In providing support for the state and community, ARNG aviation performs a variety of tasks. One program which started slowly but is gaining support rapidly is use of ARNG aircraft to fly medical evacuation type missions. Several states are taking part in evacuating victims of highway accidents and related missions. ARNG aviation units have provided support in missions dealing with civil disturbance. But by far the longest list of support is found in what can be termed special activities. To list all missions the ARNG units have taken part in would take some time . . . just a quick list includes:

Special Activities: ARNG Aviation

Ohio: ARNG aviation "medicopter" received Sikorsky Winged "S" Award for medical evacuation of highway accident victims. Jointly the Ohio Highway Patrol and Ohio State

The CH-54 Flying Crane has joined the inventory as a medium-lift helicopter in the Kansas and Alabama National Guards

University hospital staff have successfully evacuated more than 50 persons since the program started in November 1967.

South Dakota: ARNG aircraft were used for more than 70 flying hours to assist Civil Defense in bringing relief to area paralyzed by blizzard. They flew search missions, delivered food, delivered medical supplies and evacuated ill who needed hospital attention. Over 80 inches of accumulated snow, in another situation, created a potential flood hazard as warmer weather approached. SDARNG flew 116 missions for 217 hours assisting Civil Defense, Corps of Engineers and highway department in locating trouble spots.

Oklahoma: Flying command and control, ARNG aircraft assisted in evacuating an entire small Oklahoma town threatened by derailed gas-filled tank car.

Wisconsin: The governor initiated the "Friend in the Sky" program, a highway accident assistance program where ARNG aviation assisted the highway patrol in reducing highway fatalities.

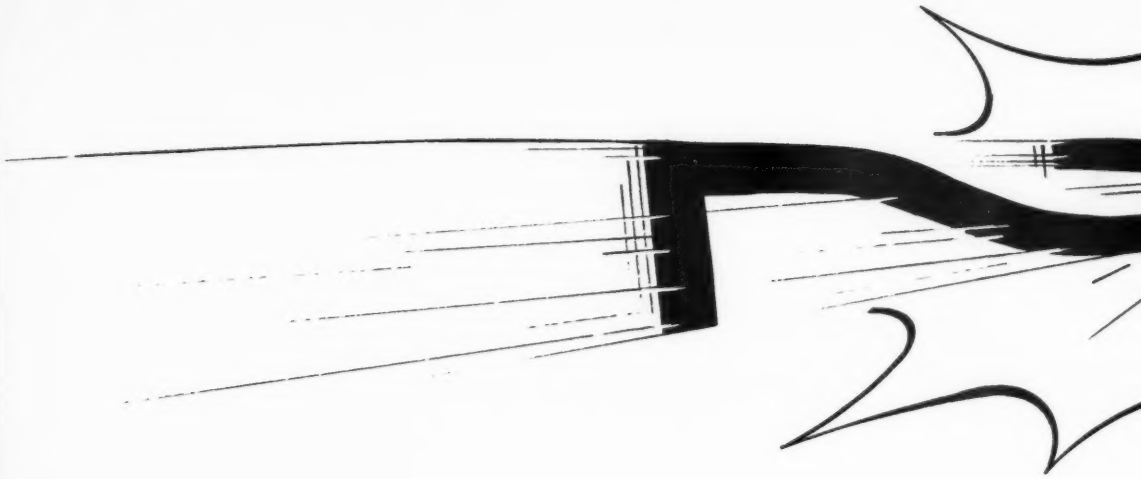
Michigan: Sikorsky Winged "S" Award presented to MIARNG for performing mercy mission. An ARNG UH-19 was used to fly in a doctor to treat a snowbound elderly woman for pneumonia and eventually evacuated her to a hospital.

Rhode Island: For 6 consecutive days a RIARNG helicopter pilot searched for a lost, retarded boy. He located the boy and directed land parties to the area when he was not able to land.

Missouri: Highway patrol aircraft crashed with three onboard; MOARNG notified and immediately dispatched a UH-19 and crew. At the crash scene and during the flight to the hospital the Vietnam experienced crew chief administered first aid.

Certainly there are problems yet to be solved, but the Guard intends to solve them. The aircraft forecast looks great. However, until these aircraft are onstation the Guard is limited by a mixed bag of inadequate, obsolescent, substitute aircraft. The logistics and training management problems presented by the modernization of its aviation force while military expenditures are being reduced is a tremendous challenge readily accepted by the Guard. The Guard's objective is to achieve at least the same level of readiness per supported flying hours as do active Army units. By providing ARNG aviation support of active Army commanders, the Guard achieves double value with its training support dollars.

With continued support of the Army and the states, the Guard aviation force will be a combat-ready force.



Two Midairs: End

THERE WAS excitement in the air as we ate chow in the mess hall after the briefing. Intelligence had learned from reliable sources that a Viet Cong battalion would be camping in a certain village in the Republic of Vietnam for 24 hours. We and our sister helicopter company were to support a South Vietnamese battalion on a combat assault in the middle of a moonless night.

Although we had worked hand-in-hand with our sister company many times, it had never been at night. We were nervous; it was going to be dark and crowded up there.

At 2100 hours I left my hootch to preflight my Charlie model UH-1 gunship for the second time. We weren't taking any chances. The mission time was scheduled for 2200 hours, so we were due to crank at 2130 hours. I remember feeling grateful for my competent crew chief as I completed the preflight . . . the ship was in good condition.

Each gun platoon sent two heavy fire teams to the AO (area of operations). We capped the area for 10 minutes and found it to be cold. The slicks were called in for the first insertion. At this point there were 35 helicopters in a two grid-square area: two heavy fire teams, two flights of slicks, one searchlight ship (commonly called Firefly), plus numerous command and control ships. The command and control (C&C) ships ranged from company level to ground commander.

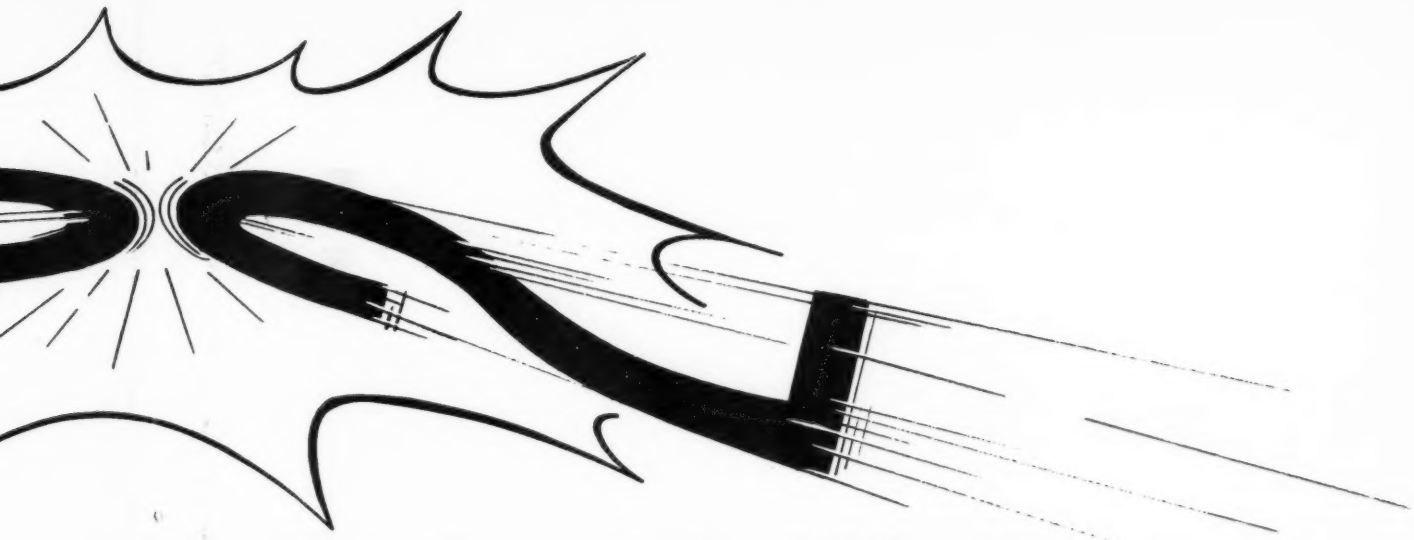
The mission itself started off extremely
the pathfinder teams went into the landing z
(LZs) with good timing and coordination, an
slicks had gotten the skeleton crews into th
lighted LZs without receiving any fire or ha
any accidents. With the recon men on the gr
the slicks were formed back into flights an
parted to pick up the troops.

Meanwhile, the gunship pilots were do
burned out flares as they orbited, waiting for
unwanted red flash of tracers to appear. A
wing flareship was somewhere up above drop
flare canisters. Flares are beautiful while bu
. . . they light up an area with such an inte
that it is easy to detect any ground mover
But they are a definite hazard when they
out. Floating lazily toward the ground, they
almost undetectable until you're right on to
them or until you hear a banging noise as the
the rotor blades. We gave those canisters p
of room.

The first lift of troops was on short final fo
LZs when the anticipated radio call came:
flight's receiving fire."

We followed the hose of red tracers to th
lage. The AK (automatic machine gun) fire
not very intense, so we let go with a coup
bursts of the minigun.

The object of the mission was to get or



ough To Last A Lifetime

CW2 Randall B. Cassels

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ground, surround the village and capture it. The LZs were situated so that we were cutting the enemy off from his escape route into the woods. Other side avenues of escape were blocked by rice paddies.

The minigun quieted the AK and we received only sporadic fire throughout the night. The mission progressed nicely and it looked like we would be "home" by 0100. We all knew that there would be hot chow and cold beer waiting, and we were doing our best to make things go smoothly and quickly.

At last came the welcome radio call from flight lead that the pickup zone (PZ) was clean and that the last insertion was in the air.

Two of our best pilots were flying lead and were doing an excellent job. Both had less than 30 days left incountry. As the flight came in on short final for the LZ there was a tremendous explosion, followed by a terrified voice screaming over the radio . . . "*Midair! Midair! Lead has had a midair collision!*"

After several minutes of stunned confusion an aircraft check was made to determine who had collided with lead. One of the C&C ships had given a light fire team (LFT), not associated with the mission, permission to reconnoiter the AO. The wingship in the LFT had apparently not seen the flight and the two aircraft collided.

The other aircraft immediately broke off and started to orbit outside the area. Two slicks were sent in—first to make a low pass over the burning wreckage, and then to land and drop troops to secure the area. One of the pilots on the ground confirmed everyone's fear, "There are no survivors."

The slicks finished up their job and returned home, while my ship and one other remained to wait for a CH-47 Chinook to come with fire buckets to put out the fire. As we circled we could see the ammo on the crashed ships exploding and sending tracers out into the darkness. The glow of the fire threw unwanted light onto the scene. When the Chinook arrived the fire was quickly extinguished. There was nothing else that could be done until morning, and since it was almost 0400 we returned home. Although extremely fatigued, no one slept much that night.

I have only been in aviation 3 years and have witnessed two midair collisions. The reasons for both were the same: an aircraft being in an area where it didn't belong and inattention.

I've related this story because witnessing two midairs is enough to last a lifetime . . . enough to make me constantly aware of and alert to the dangers involved flying in crowded air space. If only a little of this feeling gets through to others, my article will have been worthwhile.

RMY

NG Choppers Support World Cup Ski Competitions

Major Albert J. White Jr.

IF YOU'RE A SKI buff then you'd surely enjoy the assignment 12 members of the 112th Medical Company (Air Ambulance), Maine Army National Guard, undertook this past February.

For 3 days these men stood by to provide emergency aeromedevac support for the World Cup Ski Competitions at Sugarloaf Mountain, Kingfield, Me. Officials for the event had asked for support from the Maine Army National Guard. After approval had been received from the National Guard Bureau in Washington, D. C., the wheels were set in motion to support the event.

Finally, with everything in readiness two CH-34 Choctaw helicopters and five vehicles piloted and driven by two officers, three warrant officers and seven enlisted men departed Bangor for Sugarloaf Mountain.

Upon arrival at their destination the Guardsmen established operations at the first-aid room located in the mountain base lodge. The aircraft were stationed approximately 60 meters from the base lodge in an area established as a helipad.

In the event of an injury to a competitor the plan was for the National Ski Patrol to bring the injured competitor to the medical aid room in the base lodge. Then, based upon the extent and nature of the injury, a determination would be made whether to perform treatment at the aid station or medevac the victim to a hospital where the necessary treatment could be performed.

There were many injuries suffered by competitors, bystanders and noncompetitive skiers during the 3-day operation; however, none were serious enough to require helicopter evacuation. Frostbite, broken arms and legs, sprains to all parts of the body and cuts which required sutures were prominent among the injuries treated.

This mission performed by the 112th Medical Company (Air Ambulance) served a dual purpose in that it enabled the unit to provide emergency aeromedevac support and, at the same time, conduct a field training exercise. There were no idle hours for the men as they held classes on techniques of loading and unloading casualties on the CH-34 helicopters, cold weather care of casualties, cold weather survival of downed aircraft crews, use of aircraft equipment in preparation for cold weather operations, emergency first aid in cold weather climate and duties of the flight crew during aeromedical evacuation.

As the temperature held at or below the zero mark, the maintenance crews obtained some outstanding on-the-job training while working on the aircraft under severe winter conditions.

In addition to the training accomplished, a radio relay mission was provided to a flight of F104 aircraft from Loring Air Force Base during the opening ceremonies as the F104s zoomed overhead in a flyby.

During the 3-day period several practice helicopter medical evacuations were flown utilizing Guardsmen and civilian medical personnel. The flights provided practical field training which prepared the Guardsmen for a smooth-running operation in the event an actual evacuation became necessary.

A snowstorm that approached on the final day forced the Maine Guardsmen to depart Sugarloaf Mountain by noon. After their return to Bangor, maintenance was performed on all equipment.

An evaluation of the mission revealed two important points:

- The present equipment assigned can accomplish cold weather medical evacuation.
- Participating personnel are trained and ready for cold weather medical evacuation operations.

Guardsmen of the 112th Medical Company (Air Ambulance), Maine Army National Guard, practice loading a "patient" aboard their Choctaw helicopter during that unit's support of the World Cup Ski Competitions at Sugarloaf Mountain, Kingfield, Maine

HEY, DOROTHY. I see you finally made it back. How did it go today?"

"Don't ask, Henrietta! One more day like this and my tail boom will fall off!"

"What happened?"

"You know that LZ up by the cliff with the overhanging ledge?"

"Yes, I've been in there lots of times. It's big enough for three of us."

"It isn't if you have the pilot I had today. He's downright dangerous! As if pulling all I had to get me stopped wasn't enough, he wanted to take the whole LRRP team out at once."

"He didn't!?"

"He sure did! If I hadn't been keeping a little in reserve, we'd never have made it out. As it was, we cut some tree limbs and it sure did smart!"

Henrietta's chin bubbles sagged and she heaved a long sigh. "It seems they're getting worse instead of better. By the way, Dorothy, have they fixed that crack in your hydraulic line yet?"

"Are you kidding? They haven't found it yet. If I don't get a good preflight soon, I'll never make it to my next PE."

"You mean it's getting worse?"

"My pressure's lower than it was yesterday and I ache with every control movement. I squeezed some fluid out this morning, hoping the pilot or crew chief would see it. As usual, all they had on their minds was coffee and a quick departure."

"Yes, I know how it is. My engine deck hasn't been cleaned in three days and my air filter for more than a week. It's gotten so I can hardly breathe! There's a rock in my filter and if it gets loose, it'll raise cain with my compressor blades. I kept trying to warn the pilot I was clogged up, but he never looks at the oil temperature gauge."

"Doesn't your engine inlet filter light come on?"

"Not since my crew chief cut the wire when it got in his way. He'll regret it one of these days when my engine ups and quits."

"Yes, dear, and it'll serve him right!"

"Hey, look who's coming!"

"It's that floozy from down the line. Watch out, she'll blow sand on us. See how she's twisting her tail?"

"I wish I had a crew chief as good as hers."

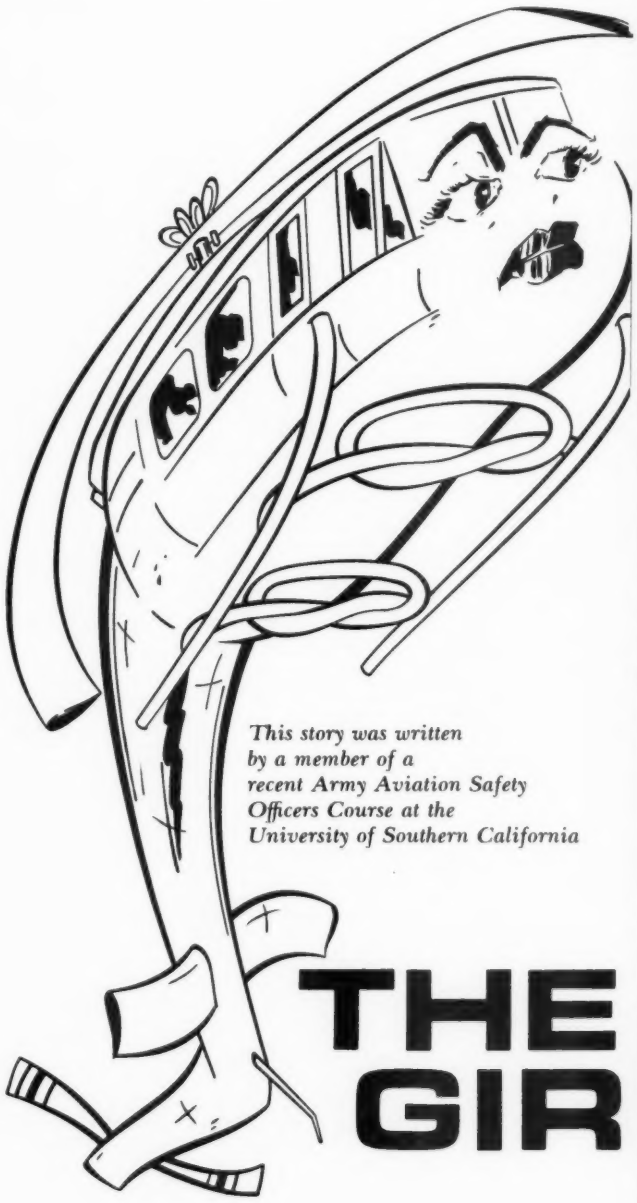
"Yes, wouldn't it be heaven to get greased every day and washed at least once a week? Look how he keeps her shined! And her makeup is always perfect!"

"We should all be so lucky!"

"That's the breaks, honey. I wish we could have been assigned to that company."

"By the way, why did you take the old man to battalion today?"

"I'm not sure. He was reading the reports on Elaine's engine failure all the way there. It must have been a bad accident. He was terribly upset when he got aboard to come home."



THE GIR

This story was written by a member of a recent Army Aviation Safety Officers Course at the University of Southern California

"Dorothy, did you hear what happened to Louise?"

"No, dear, what?"

"She's spending tonight in that LZ in the jungle!"

"She is? Isn't that dangerous?"

"Yes, but her crew didn't have their minds on their jobs and put her down on a stump. Her control cables were broken!"

"How awful! When do you suppose she'll get out?"

"I heard one of the pilots say she'd be hooked out tomorrow."

"Hey, who's that?"

"Where?"

"Over by Charlene, the gunmoll."

"I don't know. I've never seen him before."

"Me either. Look, he's coming over here, carrying a clipboard and he's writing something on it. If he gets close, see if you can find out what it is."

"If he'd just turn around—there, I can make it out. It says something about a prevention survey."

"Prevention survey, indeed! Around here? I don't believe it! Henrietta, you're pulling my skid."

"No, Dorothy, that's what it says. He has Charlene down for still having live ammunition in her guns and he's putting me down for needing window replacements. I do wish he'd look at my deck. Look, he's going to! He's writing up my filthy filter. Oh, I wish I could get hold of that paper. I'd fill it up!"

"Who is this guy?"

"He must be the new aviation safety officer I heard the crews talking about. He's supposed to have been through some big school back in the states."

"What's this survey he's making about?"

"He's making a list of everything that's not like it should be for our health."

"Oh, dear, he's leaving and he didn't see my cracked lines. I'm afraid that'll be the last we see of him."

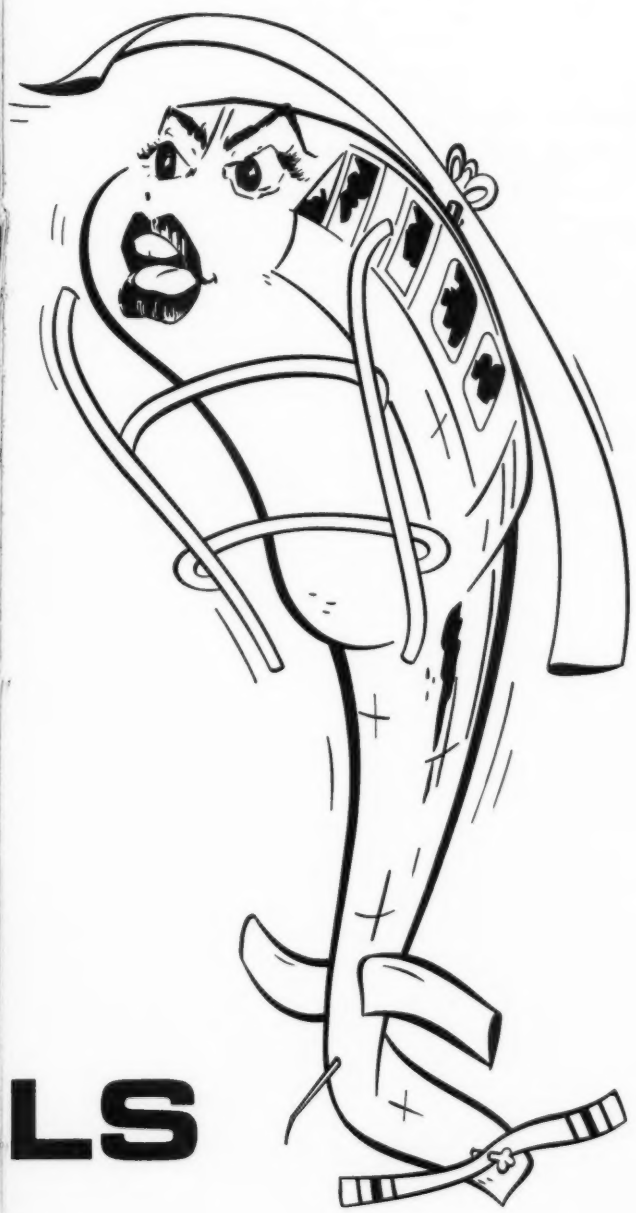
"Probably." Henrietta yawned. "Good night, Dorothy, sleep well."

"Same to you, Henrietta. I have a rock under my skid and it hurts."

"Can't you wiggle around and slip off?"

"No, that idiot pilot put me down right on top of it. I think my skid shoe's broken."

Their voices quieted, the misery-laden helicopters creaked and groaned in the chilly night wind. Up the hill in a shack, a lone man sat hunched over a table, busily writing his report from notes he had taken. Leaning back, he yawned, stretched his arms and rubbed his eyes. Softly, he said to himself, "There, that's finished. We'll find out tomorrow if the old man will buy the recommendations. If he doesn't, he's in for more embarrassing trips to the battalion CO!"



LS

Collateral Investigations of Army Aircraft Accidents

THE PURPOSE OF collateral investigations of Army aircraft accidents, as listed in ARs 95-5, Chapter 8; 95-30, paragraph 7f(2); and 385-40, paragraph 4-5b, is clearly distinct from that of safety investigations. Safety investigations are conducted *only* for accident prevention, while collateral investigations are conducted to compile accident information which can be used for purposes other than accident prevention. More specifically, collateral investigations are conducted to:

Provide witness statements and factual information, together with findings and recommendations, that may be released outside the Department of the Army to persons directly concerned with the consequences of accidents.

Determine if any culpability is involved to establish a basis for administrative or judicial proceedings concerning punitive or compensatory actions, claims and entitlements. Conversely, collateral investigations also determine *non*culpability. This determination is important for clearing surviving crew members, establishing eligibility for death gratuities, etc. This positive aspect should be emphasized to witnesses.

Collateral investigations will be conducted when:

An accident results in death or serious injury to any person, military or civilian, on the ground or in the aircraft.

An accident causes substantial damage to military or civilian property. This does not include the aircraft.

An accident may lead to criminal prosecution of military personnel in military or civilian courts.

An accident may lead to civil litigation against military personnel in civilian courts.

An accident may lead to disciplinary or administrative action against military personnel.

A commander, for any other reason, thinks a collateral investigation should be made.

Commanders, as board convening authorities, should consult their staff judge advocates if they need clarification about the necessity for conducting collateral investigations. Generally speaking, this is directly related to the seriousness of an accident. The more serious an accident, the greater is the necessity for a collateral investigation.

The composition of collateral investigation boards is largely within a commander's discretion. At minimum, the board will be composed of one commissioned officer who is currently on flight status and equal or senior in grade to the operator(s) of the aircraft involved. If equal in grade, he must be senior by date of rank. He may appoint additional personnel to the board for technical assistance. No specific AR prescribes collateral board composition. This suggested composition is based on AR 15-6, par 1, 3b, 3c(1) and 3c(4); and AR 385-40, par 4-4d(1)(a) and d(2).

Members of a safety investigation board will not be assigned to a board conducting a collateral investigation of the same accident, and collateral board members may not attend the safety investigation board proceedings (AR 95-5, Chapter 8, par c, d).

Collateral investigation boards should follow the general investigative procedures described in AR 15-6. The following requirements are particularly important:

In every case in which the conduct, status,

SP4 David D. Koski
Office for Plans and Operations
USABAAR

efficiency, character, fitness, pecuniary liability or rights of any individual are to be investigated, that individual will be afforded a hearing (par 6(1)).

An individual under investigation may have counsel (change 1 to par 8).

Testimony from witnesses should be taken under oath (par 12).

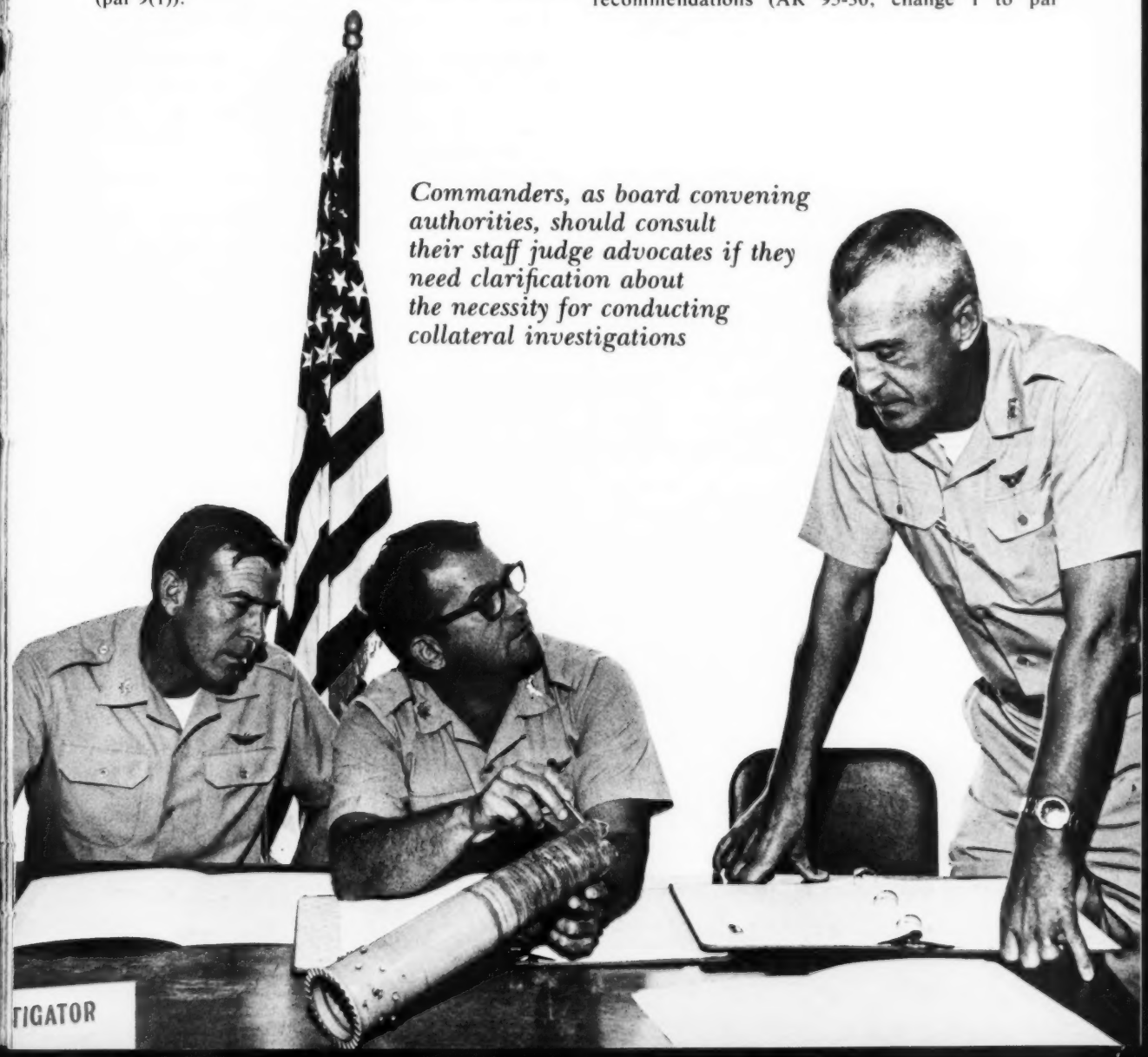
Before eliciting statements from a witness, he should be reminded of his Article 31 (UCMJ) or Fifth Amendment rights (par 13).

Witness statements should be taken verbatim (par 9(1)).

Findings based on all investigation information will be routinely made (par 19-21), and recommendations based on those findings should normally be made (par 22).

Additional procedural precautions are contained in ARs 95-5 and 95-30. These are:

Safety investigation board members should not be called as witnesses before a collateral board unless absolutely necessary to obtain vital information. If called as witnesses, they must not divulge privileged testimony, their opinion based on that testimony nor the safety board's findings or recommendations (AR 95-30, change 1 to par



Commanders, as board convening authorities, should consult their staff judge advocates if they need clarification about the necessity for conducting collateral investigations

COLLATERAL INVESTIGATIONS

7f(3)(d)). These restrictions apply to any other person who may have knowledge of the substance of a safety investigation report.

Collateral board members may not attend safety investigation board proceedings (AR 95-5, Chapter 8, par d).

Witnesses may not appear before a collateral board until they have been released by the safety investigation board (AR 95-5, Chapter 8, par e).

As stated before, the ARs do not provide collateral investigation procedures. However, it is recommended that safety investigation procedures detailed in AR 95-5, Chapters 9-12, be generally followed for collateral investigations. However, special attention must be given differing requirements, such as how to take witness statements, for the two types of investigations. Since safety investigation reports are privileged (AR 95-5, par 6-2), no portion of them can be released to collateral boards. However, a safety board may release a list of its witnesses to a collateral board and the collateral board need not necessarily duplicate everything the safety board has done. For instance, if an accident causes a death and the safety board conducts medical evaluations in accordance with AR 95-5, Chapter 12, the collateral board will usually be able to get this information simply by interviewing the doctor who did the work for the safety board. The collateral board does not need to appoint its own doctor to duplicate medical investigations already performed, unless, for some reason, the investigating doctor cannot respond to collateral board questions. The collateral board may also request photographic prints from negatives held by the safety investigation photographer (AR 95-5, par 10-2c(2)(b) and 11-3). It may also request an ARADMAC teardown analysis report (AR 95-5, par 11-5).

A collateral board is free to go beyond the scope of a safety board's investigation. For example, it can send additional aircraft parts for analysis, take more photographs, question more witnesses, etc.

There is no collateral report format specifically outlined in ARs. It may vary with the complexity and severity of the accident. However, a thorough collateral report should contain the following documents in the approximate order listed:

Cover letter, transmitting the report from the board president to the board convening authority.

Completed DA Form 1574 (Report of Proceedings by Investigating Officer).

Narrative summary of accident and background facts relevant to it (e.g., pertinent personnel and aircraft records), including a summary of findings and recommendations.

Supporting documents, attached and properly tabbed for ease of reference and identification. Examples of these are:

Special orders designating board members.

Extracted pages containing ARs pertinent to the crash.

Photographs of the crash site and the wreckage. Below each photo, enter a caption containing the photo number, a reference identifying the crash photographed and a short explanation of what the photo illustrates.

Completed DA Forms 2823 (sworn witness statements).

A high altitude crash site photograph upon which has been diagrammed the flight pattern (if known) immediately prior to impact.

Aviator records.

Survey of aircraft records. A fairly detailed typed summary will do unless the records are so pertinent they require inclusion.

Any printed checklists or other printed preliminary steps the crew may have failed to follow.

Completed DD Form 175 (flight plan).

Completed DD Form 175-1 (flight weather briefing).

Summary of weather conditions at time of flight departure.

Any pertinent matter not already included (training circulars, etc.).

Map of area around crash site.

The purpose of the collateral report, as stated, is to provide information which is readily accessible to parties within and without the government, including private litigants. Once the report is complete, the board president sends it to the board convening authority for review (AR 15-6, par 25). The convening authority reviews the report and transmits it to the JAG office at his command level, which then transmits the report to the Office of the Judge Advocate General (OTJAG). All requests for copies of information contained in collateral reports should be forwarded to OTJAG (AR 385-40, par 4-5d).

PEARL'S

personal equipment and rescue/survival lowdown

IN THE January 1971 issue, I published a listing of personal protective, rescue and survival equipment to be used as a guide in determining equipment authorization and to aid in the procurement of the desired equipment. At that time, I promised a listing of components to the various sets. As a starter, here is a current listing of the components to the various survival kits, nonmedical, which are now in the field. The listings can also be found in Federal Supply Catalog Identification List C8440/70-IL-A, with Change Bulletin CB8440/70-IL-A, dated 1 March 1971.

FSN — **DESCRIPTIVE DATA**

8465-973-1862 **SURVIVAL KIT, INDIVIDUAL:** w/legend "SURVIVAL KIT COLD CLIMATE"; furnished w/case; MIL-43436 (GL); c/o the following components:

FSN	ITEM NAME	QTY
8465-485-3034	Bag, Storage, Drinking Water	1
8465-265-4925	Box, Match	1
@6260-840-5578	Candle, Illuminating, Type I	5
8465-082-2512	Case, Individual Survival Kit	1
8465-082-2514	Case, Individual Survival Kit	1
@6605-515-5637	Compass, Magnetic, Unmounted, Type I, MC-1	1
@6545-965-2394	First Aid Kit, Aviator	1
@7810-558-2685	Fishing Tackle Kit	1
@8970-082-5665	Food Packet, Survival	7
@9110-263-9865	Fuel, Compressed, Trioxane	3
8415-935-3130	Insect Net, Head	1
@5110-162-2205	Knife, Pocket	1
@9920-985-6891	Match, Nonsafety	(boxes) 3
@6350-261-9772	Mirror, Emergency Signaling	1
@7330-082-2398	Pan, Frying	1
8405-935-3257	Poncho	1
@5110-733-7129	Saw-Knife-Shovel Assembly, Type A-2	1
@1370-309-5028	Signal, Smoke and Illumination Marine	2
8465-753-3226	Sleeping Bag, SRU-15/P	1
@7340-170-8374	Spoon, Picnic	1
@9525-596-3498	Wire, Commercial Brass	1

Mfr	Mfr No.	Name	Qty
Dept of the Army	FM 21-76	Manual, Survival	1
Army Natick Labs	TM 55-8465-212-10	Operator's Manual	1
Army Natick Labs	11-1-170	Packing List	1

8465-782-3003 **SURVIVAL KIT, INDIVIDUAL:** w/legend "SURVIVAL KIT, OV-1 AIRCRAFT, COLD CLIMATE"; furnished w/case; MIL-S-43457 (GL); c/o the following components:

FSN	ITEM NAME	QTY
8465-485-3034	Bag, Storage, Drinking Water	1
8465-265-4925	Box, Match	1
@6260-840-5578	Candle, Illuminating, Type I	2
8465-269-9772	Case, Individual Kit	1

FSN	DESCRIPTIVE DATA

8465-782-3003 **SURVIVAL KIT, INDIVIDUAL: (cont'd)**

FSN	ITEM NAME	QTY
@6605-515-5637	Compass, Magnetic, Unmounted, MC-1	1
@7810-558-2685	Fishing Tackle Kit	1
@8970-082-5665	Food Packet, Survival	3
@9110-263-9865	Fuel, Compressed, Trioxane	3
8415-935-3130	Insect Net, Head	1
@5110-162-2205	Knife, Pocket	1
@9920-985-6891	Match, Nonsafety	(boxes) 3
@6350-261-9772	Mirror, Emergency Signaling	1
@7330-792-7991	Pan, Frying	1
@5110-570-6896	Saw Assembly, Hand, Fingergrip	1
@1370-309-5028	Signal, Smoke and Illumination Marine	2
8465-753-3226	Sleeping Bag, SRU-15/P	1
@7340-170-8474	Spoon, Picnic	1
@8510-162-5658	Sunburn Preventive Preparation	1
8465-254-8803	Whistle, Ball	1
@9525-596-3498	Wire, Commercial Brass	1

Mfr	Mfr No.	Name	Qty
Dept of the Army	FM 21-76	Manual, Survival	1
Dept of the Air Force	AFM 64-15	Manual, Survival	1
Army Natick Labs	11-1-570	Packing List	1
Army Natick Labs	TM 55-8465-209-10	Operator's Manual	1

8465-973-1861 **SURVIVAL KIT, INDIVIDUAL:** w/legend "SURVIVAL KIT HOT CLIMATE"; furnished w/case; MIL-S-43302 (GL); c/o the following components:

FSN	ITEM NAME	QTY
8465-485-3034	Bag, Storage, Drinking Water	1
8465-265-4925	Box, Match	1
8465-082-2513	Case, Individual Survival Kit	1
8465-082-2514	Case, Individual Survival Kit	1
@6605-515-5637	Compass, Magnetic, Unmounted, Type MC-1	1
@6545-965-2394	First Aid Kit, Aviator	1
@7810-558-2685	Fishing Tackle Kit	1
@8970-082-5665	Food Packet, Survival	6
@9110-263-9865	Fuel, Compressed, Trioxane	(box) 1
8415-270-0229	Hat, Reversible, Sun	1
8415-935-3130	Insect Net, Head	1
@5110-162-2205	Knife, Pocket	1
@9920-985-6891	Match, Nonsafety	(boxes) 3
@6350-261-9772	Mirror, Emergency, Signaling	1
@7330-082-2398	Pan, Frying	1
@1370-309-5028	Signal, Smoke and Illumination Marine	2
@7340-170-8374	Spoon, Picnic	1
@8510-162-5658	Sunburn Preventive Preparation	1
8340-485-3012	Tarpaulin	1
8465-973-4807	Tool Kit, Survival	1
@8960-243-2103	Water, Drinking, Canned	12
8465-254-8803	Whistle, Ball	1
@9525-596-3498	Wire, Commercial Brass	1

FSN	DESCRIPTIVE DATA

8465-973-1861 **SURVIVAL KIT, INDIVIDUAL: (cont'd)**

Mfr	Mfr No.	Name	Qty
Dept of the Army	FM 21-76	Manual, Survival	1
Army Natick Labs	TM 55-8465-213-10	Operator's Manual	1
Army Natick Labs	11-1-168	Packing List	1

8465-965-4701 **SURVIVAL KIT, INDIVIDUAL:** w/legend "SURVIVAL KIT, OV-1 AIRCRAFT, HOT CLIMATE"; furnished w/case; MIL-S-43428 (GL); c/o the following components:

FSN	ITEM NAME	QTY
8465-485-3034	Bag, Storage, Drinking Water	1
8465-265-4925	Box, Match	1
8465-369-9772	Case, Individual Survival Kit	1
@6605-515-5637	Compass, Magnetic, Unmounted, MC-1	1
@7810-558-2685	Fishing Tackle Kit	1
@8970-082-5665	Food Packet, Survival	3
@9110-263-9865	Fuel, Compressed, Trioxane	3
8415-935-3130	Insect Net, Head	1
@5110-162-2205	Knife, Pocket	1
@9920-985-6891	Match, Nonsafety	(boxes) 3
@6350-261-9772	Mirror, Emergency Signaling	1
@7330-792-7991	Pan, Frying	1
@5821-912-4480	Radio Set, ACRRT-10	1
@5110-570-6896	Saw Assembly, Hand, Fingergrip	1
@1370-309-5028	Signal, Smoke and Illumination Marine	2
@7340-170-8374	Spoon, Picnic	1
@8510-162-5658	Sunburn Preventive Preparation	1
8340-485-3012	Tarpaulin	1
@8960-243-2103	Water, Drinking, Canned	4
8465-254-8803	Whistle, Ball	1
@9525-596-3498	Wire, Commercial, Brass	1

Mfr	Mfr No.	Name	Qty
Dept of the Army	FM 64-5	Manual, Survival	1
Army Natick Labs	11-1-299	Packing List	1
Army Natick Labs	TM 55-8465-210-10	Operator's Manual	1

8465-973-1863 **SURVIVAL KIT, INDIVIDUAL:** w/legend "SURVIVAL KIT OVERWATER"; furnished w/case; MIL-S-43301 (GL); c/o the following components:

FSN	ITEM NAME	QTY
8465-485-3034	Bag, Storage, Drinking Water	1
@2090-277-6583	Bailer, Boat	1
8465-265-4925	Box, Match	1
8465-082-2511	Case, Individual Survival Kit	1
8465-082-2514	Case, Individual Survival Kit	1
@6605-515-5637	Compass, Magnetic, Unmounted, MC-1	1
@4610-372-0592	Desalter Kit, Sea Water	3
@6545-965-2394	First Aid Kit, Aviator	1
@7810-558-2685	Fishing Tackle Kit	1
@8970-082-5665	Food Packet, Survival	3
@9110-263-9865	Fuel, Compressed, Trioxane	3
8415-270-0229	Hat, Reversible, Sun	1
8415-935-3130	Insect Net, Head	1
@5110-162-2205	Knife, Pocket	1

FSN	DESCRIPTIVE DATA

8465-973-1863 **SURVIVAL KIT, INDIVIDUAL: (cont'd)**

FSN	ITEM NAME	QTY
@4220-726-0424	Life Raft, Inflatable, LUR-3/P	1
@9920-985-6891	Match, Nonsafety	(boxes) 3
@6350-261-9772	Mirror, Emergency Signaling	1
@2040-485-3018	Paddle, Boat	2
@7330-082-2398	Pan, Frying	1
@2090-693-1471	Repair Kit, Inflatable Life, Craft	1
@6850-270-9986	Sea Marker, Fluorescein	2
@1370-309-5028	Signal, Smoke and Illumination Marine	2
@7920-240-2555	Sponge, Cellulose	1
@7340-170-8374	Spoon, Picnic	1
@8510-162-5658	Sunburn Preventive Preparation	1

Mfr	Mfr No.	Name	Qty
Army Natick Labs	TM 55-8465-214-10	Operator's Manual	1

8465-965-4702 **SURVIVAL KIT, INDIVIDUAL:** w/legend "SURVIVAL KIT, OV-1 AIRCRAFT, OVER-WATER"; furnished w/case; MIL-S-43423 (GL); c/o the following components:

FSN	ITEM NAME	QTY
8465-485-3034	Bag, Storage, Drinking Water	1
8465-228-9017	Case, Individual Survival Kit	1
8465-782-3032	Case, Individual Survival Kit	1
@6605-515-5637	Compass, Magnetic, Unmounted, MC-1	1
@4610-372-0592	Desalter Kit, Sea Water	1
@7810-558-2685	Fishing Tackle Kit	1
@8970-082-5665	Food Packet, Survival	1
8415-270-0229	Hat, Reversible, Sun	1
@5110-162-2205	Knife, Pocket	1
@4220-143-9100	Life, Raft, Inflatable	1
@6350-261-9772	Mirror, Emergency Signaling	1
@5821-912-4480	Radio Set, ACRRT-10	1
@6850-270-9986	Sea Marker, Fluorescein	2
@1370-309-5028	Signal, Smoke and Illumination Marine	2
@7920-240-2555	Sponge, Cellulose	1
@8510-162-5658	Sunburn Preventive Preparation	1
8465-254-8803	Whistle, Ball	1

Mfr	Mfr No.	Name	Qty
Army Natick Labs	11-1-243	Packing List	1
Army Natick Labs	TM 55-8465-211-10	Operator's Manual	1

8465-935-4728 **SURVIVAL KIT, INDIVIDUAL:** w/legend "SURVIVAL KIT, INDIVIDUAL, LIGHT-WEIGHT, ARMY"; furnished w/case; Rocket Jet part 776000-1

FSN	ITEM NAME	QTY
@6510-913-7909	Bandage, Adhesive	6
@6510-913-7906	Bandage, Gauze, Elastic	1
@8935-935-6759	Bouillon Cube	4
@6505-913-7907	Capsule, Pain Killer	12
@8950-132-6352	Chili Powder	1
@6230-917-6692	Flash Guard	1
@7340-098-4327	Knife, Hunting, Sheathed	1
@6230-938-1778	Light, Marker, Distress, SDR-5/E	1
@6505-159-6625	Ointment, Antibiotic	1
@6505-530-6469	Ointment, Eye	1

FSN	DESCRIPTIVE DATA			
8465-935-4728	SURVIVAL KIT, INDIVIDUAL: (cont'd)			
	FSN	ITEM NAME		QTY
	@8950-935-6758	Pepper, Black		(pkt) 2
	@6510-782-6426	Plaster, Adhesive, Surgical		1
	@1095-941-1311	Projector, Pyrotechnic		1
	@8950-935-6760	Salt		(pkt) 2
	@1370-907-6198	Signal, Personnel, Distress, SDK-15/P25S-1		4
	@6505-913-6872	Tablet, Anti-Diarrhea		12
	@6505-782-6481	Tablet, Anti-Infection		12
	@6505-913-7905	Tablet, Anti-Malaria		3
	@6505-914-3592	Tablet, Salt		20
	@6505-914-2198	Tablet, Stay-Awake		10
	@6850-985-7166	Tablet, Water Purification		(bottle) 1
	@4720-890-5003	Tubing, Plastic		1
	@9525-596-3499	Wire, Snare, Brass		(ft) 20
	Mfr	Mfr No.	Name	Qty
	Rocket Jet Corp	776302	Bag, Kit Carrying	1
	Rocket Jet Corp	776400	Bag, Water Storage	1
	Rocket Jet Corp	776410	Base, Component Packing	1
	Rocket Jet Corp	776800-19	Booklet, Instruction, w/Pencil	1
	Rocket Jet Corp	776800-15	Candle	1
	Rocket Jet Corp	776304	Card Components List and Instructions	1
	Rocket Jet Corp	776800-8	Compass, Wrist w/Strap	1
	Rocket Jet Corp	776200	Container Assembly, Lower	1
	Rocket Jet Corp	776800-5	Dish, Aluminum	1
	Rocket Jet Corp	776800-3	Firestarter Sheets and Tinder	1
	Rocket Jet Corp	776800-10	Fishing Kit	1
	Rocket Jet Corp	776800-11	Fishing Line	1
	Rocket Jet Corp	776800-14	Flashlight w/Lanyard	1
	Rocket Jet Corp	776404	Hacksaw Blade Assembly	1
	Rocket Jet Corp	776800-12	Headnet and Mittens, Mosquito	(set) 1
	Rocket Jet Corp	776303	Holster	1
	Rocket Jet Corp	776401	Knife Blade Assembly	1
	Rocket Jet Corp	776100	Lid Assembly, Container	1
	Rocket Jet Corp	776800-2	Matches, Water Resistant and Flint Synthetic	(pkg) 1
	Rocket Jet Corp	776300	Mirror, Emergency Signaling	1
	Rocket Jet Corp	776800-9	Nylon Cord (40 ft)	1
	Rocket Jet Corp	776500-3	Ointment, Sunscreen and Repellent	1
	Rocket Jet Corp	776800-4	Pliers, Needlenose	1
	Rocket Jet Corp	776800-23	Receptacles, Waterproof	2
	Rocket Jet Corp	776800-7	Saw, Assembly, Fingergrip	1
	Rocket Jet Corp	776800-6	Sewing Kit	1
	Rocket Jet Corp	776500-1	Soap, Surgical	1
	Rocket Jet Corp	776800-13	Sponge	1
	Rocket Jet Corp	776800-24	Still, Solar	1
	Rocket Jet Corp	776800-16	Toothbrush w/Dentifrice	1
	Rocket Jet Corp	776500-15	Tweezers (1) and Safety Pins (3)	(pkg) 1
	Rocket Jet Corp	776800-18	Whistle, Plastic, w/Lanyard	1
	Army Natick Labs	TM 55-8465-208-10	Operator's Manual	1

STATISTICALLY SPEAKING

Herbert V. Jackson
Data Center, USABAAR

DO PRECAUTIONARY landings forestall accidents? Is the accident rate reduced as the rate of precautionary landings increases? Logically, investigations of minor problems will reduce major problems. The pop you hear from the hood of your car could be the fan belt. Delay in investigating this noise could result in overheating the engine, damage to the engine or engine failure. The odor you smell may be brake fluid. If not investigated, the highway patrol may be called on to investigate your accident. To investigate these indications of trouble, you must pull off the road and stop as other motorists cruise happily by. Aggravating, isn't it? But it's necessary to prevent major problems and accidents from developing.

A precautionary landing can also be aggravating, especially if you're only a short distance from your destination and flying an aircraft in which you are highly experienced. If you put it down, you may have to walk out to a highway, hitch a ride and file a report. But you'll have a choice about where to land. Delay the landing and you may well have no choice.

Is there any proof supporting the logic that a higher precautionary landing rate has a significant effect on the accident rate? Analyses of rotary wing rates during the period 1 July 1969 through 31 January 1971 support this logic. Monthly rotary wing data for this period is shown in the accompanying table. This table was expanded to provide the varied summations required for analyses.

The scatter diagram displays the relationship between the two variables. Each point is dated to provide a more meaningful picture. From the diagram, you can readily see the accident rate is smaller at points where the precautionary landing rate is larger.

To describe the functional relationship between the two variables, an *estimating line* was fitted to the data. The sum of the squares of the *Y* (vertical) deviations from the points to the line are less than any other straight line. This *line of best fit* was computed, using the *least squares* method, and plotted over the scatter diagram to make the trend more evident. The value of the constants *a* and *b* in the equation for a straight line, $Y_c = a+bX$, was determined by simultaneously solving the following equations:

1. $\Sigma Y = Na + b\Sigma X$
2. $\Sigma XY = a\Sigma X + b\Sigma X^2$

By substituting appropriate values from the table, the equation of the *line of best fit* was found to be $Y_c = 30.58 - .21X$. The constant *b* describes the slope of the line. This negative slope (-.21) indicates a decreasing trend. To determine the normalcy of distribution, the *standard error of estimate* was computed by substituting the appropriate summations from the table and solving the following formula:

$$S_{Y-X} = \sqrt{\frac{\Sigma(Y-\bar{Y})^2 - \Sigma(Y_c-\bar{Y})^2}{N}}$$

The *standard error of estimate* was found to be 2.22. This can be used as the standard deviation of a frequency distribution. It is an estimate of the range above and below the *line of estimation* in which approximately 68.27 percent of the points may be expected to fall if the scatter is normal. This range is plotted on the scatter diagram and includes 13 of the 19 points, or 68.42

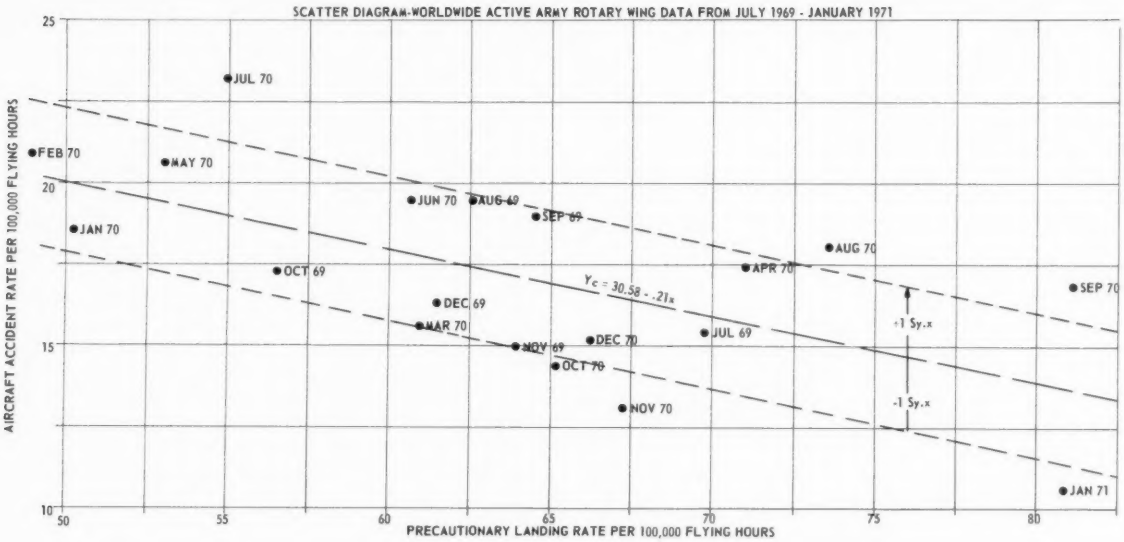
Worldwide Rotary Wing Precautionary Landing Rates and Aircraft Accident Rates, Their Computed Trend Values, and Their Deviations From The Mean Accident Rate

	P/L Rate	Acdt Rate	Computed Y Values	Deviations	
	X	Y	Y_c	$Y-\bar{Y}$	$Y_c-\bar{Y}$
Jul 69	69.79	15.44	15.92	-1.72	-1.24
Aug 69	62.71	19.38	17.41	2.22	.25
Sep 69	64.60	18.97	17.01	1.81	-.15
Oct 69	56.70	17.36	18.67	.20	1.51
Nov 69	64.02	14.94	17.14	-2.22	-.02
Dec 69	61.65	16.30	17.63	-.86	-.47
Jan 70	50.35	18.61	20.01	1.45	2.85
Feb 70	49.07	20.89	20.28	3.73	3.12
Mar 70	61.05	15.60	17.76	-1.56	.60
Apr 70	71.15	17.40	15.64	.24	-1.52
May 70	53.06	20.57	19.44	3.41	2.28
Jun 70	60.82	19.45	17.81	2.29	.65
Jul 70	54.98	23.16	19.03	6.00	1.87
Aug 70	73.70	18.00	15.10	.84	-2.06
Sep 70	81.33	16.76	13.50	-.40	-3.66
Oct 70	65.39	14.38	16.85	-2.78	-.31
Nov 70	67.49	13.15	16.41	-4.01	-.75
Dec 70	66.34	15.03	16.65	-2.13	-.51
Jan 71	80.97	10.73	13.58	-6.43	-3.58

$\Sigma X = 1215.17$ $\Sigma Y = 326.12$ $\Sigma(Y-\bar{Y})^2 = 158.8056$

$\Sigma X^2 = 79,194.3175$ $\Sigma Y^2 = 5756.3976$ $\Sigma(Y_c-\bar{Y})^2 = 65.1434$

$\Sigma XY = 20,547.6018$ $N = 19$ $\bar{Y} = 17.16$



percent. The distribution appears normal at this point. However, within a range of two *standard errors of estimate* from the *line of estimation*, we could expect about 95 percent of the points to appear for normal distribution, almost all within three *standard errors of estimate*. By visually extending the range by another *standard error of estimate* you can readily see that all points fall within this range. The small size of the sample may account for this slight discrepancy.

To measure the degree of relationship between these two variables, the *coefficient of correlation* was computed by substituting appropriate summations from the table and solving the following formula:

$$r = \frac{N\Sigma XY - (\Sigma X)(\Sigma Y)}{\sqrt{[N\Sigma X^2 - (\Sigma X)^2][N\Sigma Y^2 - (\Sigma Y)^2]}}$$

The absolute value of r will range between 0 and 1. The nearer this value is to 1, the greater the correlation. The sign of r, if positive, tells us accident rates increase as precautionary landing rates increase. If negative, it tells us accident rates decrease as precautionary landing rates increase. The correlation coefficient was determined to be -.64, again indicating a decreasing trend in the accident rate as the precautionary landing rate increases.

A test of significance indicates the calculated correlation coefficient, r, is significant at the 0.5 percent level and a correlation between accident rates and precautionary landing rates does exist. A test of significance of the slope of the *line of best fit* resulted in the same conclusion. Analysis of the data by type and model of aircraft, as well as by major command, indicated that no particular aircraft or command contributed significantly to this trend.

Interpretation of these results does not mean that high accident rates are caused by low precautionary landing rates, nor does it mean that accident rates may be reduced by simply making more precautionary landings. Nevertheless, the fact remains that during periods of high precautionary landings, we can expect a significant decrease in accident rates. This decrease is described by the slope (-.21) of the *estimating line*. This may be simplified by stating that we can expect the number of accidents to be reduced by approximately 21 for each 100 precautionary landings. This may vary by an amount equal to the *standard error of estimate* (2.22) in approximately two-thirds of the cases. In other words, two-thirds of the time, the number of accidents may be expected to decrease by 19 to 23 for each increase of 100 precautionary landings. The remaining cases may exceed this amount of variation. However, with a large number of cases, almost all would be reduced by an amount ranging from 14 to 28 accidents for each increase of 100 precautionary landings.

Statistically speaking, isn't it better to have five precautionary landings than one accident?

TAKE OFF THE RING, **NOT** THE FINGER

AH HA!" snapped Sergeant Torkwrench's wife as he stepped through their front door after a hard day's work and two—maybe three—beers at Happy Hour. "Caught you at last!" He paled and rapidly inventoried his recent undisclosed sins, wondering which had been exposed and how. "Where's your wedding ring, you wretch?" she shrieked before he had time to complete his inventory and search for an alibi.

"In my pocket," he replied, heaving a sigh of relief.

"What's it doing there?" she hissed. "You been playing bachelor again!?"

"No! The maintenance officer told me to take it off. And the CO, safety officer and flight surgeon agreed with him!"

Mrs. Torkwrench's anger faded. Her hands dropped to her sides. "What got those four together?"

"The unit safety meeting." Torkwrench's voice calmed. "The safety officer told us that wearing rings, watches and ID bracelets and tags can be dangerous for people who work with their hands. Jewelry can snag on protruding parts of the stuff we work with, whether it's aircraft or vehicle maintenance, carpentry, plumbing, painting, machinery operation or any other job where you work with your hands. He also reminded us that metal jewelry and neck chains make excellent electrical conductors. Not only can you get a nasty shock if your jewelry touches some hot circuit, you may crack your head or fall off a maintenance platform when you jump from the shock.

"The flight surgeon explained why it's so dangerous to catch a watch or ring on something, especially if you are getting down from a platform, ladder or any other high place. He said that when a ring hangs up on something, the skin of your finger is usually cut through all the way around. Your finger could be cut off by the ring itself. But doc said, even if it isn't, the finger usually has to be amputated. When the skin is peeled past a knuckle, the blood supply to the skin is damaged so that it can't be repaired. The skin will die, leaving the tendons exposed, and the finger has to go.

"If a wristwatch peels the skin off and doesn't cut any tendons, the doc said, maybe a skin graft can be used to cover the bare area, if you're lucky. I don't even like to think about what could happen if a neck chain gets caught on something.

"After the doc was through, the old man got up and told us a good unit safety program takes more than just a monthly meeting. Each one of us has to take our responsibilities for doing things right. The flight surgeon and safety officer can tell us about hazards, but it's my job to remember to take off my ring and watch each day. As a supervisor, I have to make sure my people do, too. The CO left no doubt in anyone's mind that he was 100 percent behind the safety officer, the doc and supervisory personnel when it comes to practicing and, if need be, enforcing fulltime accident prevention."

"OK, OK," said Mrs. Torkwrench, "Wash up and come to supper. Next time, put your ring back on *before* you go to Happy Hour."

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WHO PUT THE GEAR DOWN?

A PILOT AND IP were on a U-21A transition training mission. After making several landings and takeoffs, the IP decided to make one final landing. He told the pilot to make a short field landing.

IP: "During our last approach, there was another U-21 in the traffic pattern. It was on the runway during our downwind leg. A helicopter had just landed and there were two other aircraft in the area. The tower operator was talking to the pilot of the U-21 on the runway, as well as the pilots of the other aircraft. At this time, I was looking out of the cockpit for one of the helicopters. About the same time, a helicopter had gone by the south end of the field. There had also been aircraft passing at low level to the north of the field. In fact, we were ending our transition training at that time because there were too many aircraft in the air and I did not think we could safely continue. . . .

"As we came onto final, the aircraft in the southeast corner of the field had started to move and was out of the way. The pilot set the approach up and everything was looking real good on final. Turning final, we still had about 500 feet altitude and were 6,000 to 8,000 feet from the end of the runway. The aircraft was traveling at 80 knots and carrying 80 percent power, with a descent rate of 200 to 300 fpm. The approach looked beautiful. The first time we realized some-

thing was wrong was when the propellers hit the runway. I thought about trying to take it back up, but I knew that, with our rate of descent, the propellers would be messed up. Since we were already close to the ground, I decided to land.

"I got on the controls with the pilot and we kept the aircraft in the center of the runway and rolled out. Before coming to a stop, I cut off the condition levers and told the pilot to cut off all switches. I leaned across his lap and cut off the fuel firewall valve. As soon as the aircraft stopped, the pilot hit the gang bar, turning off the battery and generator."

Questions asked IP:

"What procedure was used regarding the checklist?"

"We had followed a pretakeoff checklist on the first takeoff, but did not go through the complete check while we waited at the end of the runway. I called out items, such as props, trim, friction, etc., and the pilot responded with the appropriate action.We did not read the specific prelanding steps from the checklist. The pilot would drop the flaps and gear and one of us would key the microphone and say 'three green.' The other would then respond by saying 'Roger, three green.' On downwind, the pilot would hit the parking brake. Since the radar was completely out, we ignored it insofar as the other item on the prelanding check. After checking the brake, the pilot would drop the gear and come in for the landing."

"Do you recall placing the gear handle down?"

"On this final approach, I do not remember the exact moment at which the pilot put the flaps down, but I did check to see that they were lowered midway through the downwind. However, during the approach, there were no steps taken to put down the gear. We did not get a warning horn or see the red light in the gear handle on this landing. The power levers have to be retarded back to about 200 pounds of torque to activate the warning horn. Since we were performing a power approach, we were carrying about 400 pounds of torque and the power levers were not retarded."

"Is there a noticeable difference between a normal and short field landing?"

"In the cockpit during a short field landing, there is a considerably different feeling in terms of speed and noise. The big difference is that, when turning final, you are traveling much slower than for a regular landing, yet pushing much more power. Essentially, you are dragging the aircraft in and, on touchdown, you immediately go to full reverse."

"Have you practiced short field landings before with this pilot?"

"I have flown with the pilot on several other occasions and we practiced short field landings sometime last week."

"When was the gear put down?"

"I do not recall anyone putting the gear down. The flaps were put down during the downwind portion of the approach, as I was talking to the tower. I continued my conversation with the tower throughout the approach, continuously looking for the other helicopter."

"Do you recall a final gear check?"

"On final, I did not check to see if the gear was down because I was still looking for the other aircraft, which I never did locate. I was looking in and out of the cockpit during final. The pilot put his propellers in the full forward position when he started to turn final. I do not know why a gear check was not made at this time. I guess I just relaxed more than I should have, because the pilot had been doing so well. I guess I depended on him more than I should have."

"Can you explain why the gear handle was down after the accident?"

"The only explanation I can give is that one of us may have bumped the handle getting out."

Analysis: "Based on the facts established during the investigation, the cause of this accident was the failure of the pilot and instructor pilot to place the landing gear handle in the down position. The most probable contributing factor was lack of crew discipline due to failure to adhere to the prescribed landing checklist procedures, insofar as the landing checklist was not adequately used. A suspected cause factor was the relative sudden transition in landing maneuvers from normal to short field landings, which required increased concentration by the pilot for different techniques. At the same time the pilot was engrossed in short field landing procedures, the IP's attention was diverted outside the cockpit during most of the approach due to his justified concern for other traffic in the immediate area. Finally, in the configuration required for a short field landing, the gear warning horn did not sound because the power levers were not retarded enough to activate it."

Recommendations:

"1. Flight training always be conducted in an atmosphere of formality sufficient to ensure alertness on the part of IPs and students and to guard against the development of complacency and

overconfidence on the part of students.

"2. Paragraph 4-4, AR 95-1, concerning use of checklists be complied with, particularly during training flights.

"3. A note be inserted in the U-21A dash 10 warning pilots that the landing gear warning horn is not activated at power settings normally used during approaches for minimum running landings."

Approving authority: "The failure of the IP to use the prelanding checklist in accordance with established regulations contributed directly to the accident.

"Although not established by the accident investigation board, overall supervision of IPs and unit training programs is suspected as a contributing factor. Accordingly, major subordinate commands have been directed by command letter to review training and operational policies and procedures to ensure that proper standards of cockpit discipline are maintained at all times during training and operational missions."

FORTY POUNDS OF FUEL

OH-6A PILOT: "With 250 pounds indicated fuel, I took off for a visual reconnaissance mission, escorted by an AH-1G. After approximately 50 minutes, I reported having 80 pounds of fuel to the Cobra pilot and in a short time we departed for fuel. It was hazy and the visibility was poor. I wasn't sure about our exact location when we left, but we soon located friendly ground elements and I landed to ask where we were. While on the ground, I saw the fuel gauge was reading 40 pounds.

"We took off again and were flying low level at approximately 90 knots. After flying about 2½ miles, I began a cyclic climb to gain altitude. As my air speed bled off to 60 knots, I nosed over to regain air speed and the engine quit. I immediately lowered collective and brought the cyclic aft to maintain 60 knots. At approximately 40 feet, I began a flare. Just before touchdown, the rotor rpm was low and the collective was full up. We crashed."

The pilot was seriously injured and his observer and crew chief were killed.

Analysis: ". . . the pilot used poor judgment in taking off with 40 pounds of fuel remaining. It is very doubtful this amount of fuel would have been enough to reach the refueling point. He should have shut down in a secure area and waited for fuel to be brought to him.

"Engine failure was caused by fuel starvation. This was most likely caused by the fuel inlet being uncovered when the pilot made a cyclic climb, followed by lowering the nose. As the fuel flowed from one end of the tank to the other, caused by this pitching movement, it was probable the fuel inlet was uncovered. A DA letter concerning flight standardization states: '. . . uncoordinated or violent maneuvers shall not be performed when the fuel quantity is 40 pounds or less or when the fuel low light is on.' It is unknown whether the pilot was aware of this message. It is not in the dash 10." Note: Paragraph 7-24m, Chapter 7, of the dash 10, now includes a warning about uncoordinated or violent maneuvers with less than 40 pounds of fuel.

"The pilot failed to perform a proper autorotation after the engine stopped. A characteristic of the OH-6A, stated in the dash 10, is that when engine failure occurs, a 3-inch rearward movement of the cyclic is required to prevent the helicopter from diving. The lack of rotor rpm is an indication the pilot may never have lowered the collective to the full down position. He said the collective was in the full up position at impact. Low rotor rpm was also substantiated by failure of the main rotor blades to sever the tail boom. The pilot said the controls were very stiff during the last moments of the autorotation. It is believed the observer may have hampered control movements. . . .

"The crew chief died of head injuries which might have been prevented if his helmet had not come off and he had been wearing a shoulder harness. Many gunner/crew chiefs are not in the habit of wearing the shoulder harness in the back of OH-6As because the harnesses do not have inertia reels and restrict their movements. In order to do their jobs properly, they must have freedom of movement to observe and return fire."

Accident Briefs

180 DEGREES DOWNWIND

AN OH-6A PILOT FLEW approximately 1 hour and 25 minutes, landed at a field site and discharged a passenger. He then hovered rearward, picked up two passengers and made an altitude over air speed takeoff. At approximately 100 feet and 25 knots, the engine failed. The pilot made a sharp 180-degree turn downwind in an attempt to return to the LZ. The helicopter assumed a slightly nose low attitude and was traveling at a high rate of ground speed. It touched down at a high rate of descent and bounced 4 to 7 feet, then traveled approximately 15 more feet where the left skid hooked the corner of a partially buried metal pallet. It then slid 20 more feet, stopped on its right side and burned. The pilot and both passengers were

killed.

Questions asked technical inspector:

"How much experience do you have on OH-6As?"

"Seven months, all on this tour. I had never been close to an OH-6 until I got here."

"Are you allowed sufficient time to repair the aircraft or are you pressured to maintain availability?"

"We're pressured a good bit, but we usually manage to get it done. The TO&E only calls for one toolbox to maintain five LOHs and it just doesn't seem adequate."

"Are you school trained for the OH-6A?"

"No."

"Is the maintenance officer school trained?"

"No."

"Do the pilots check fuel sumps and filter drains during daily preflights?"

"Yes."

"Do they check fuel samples in a glass jar prior to refueling?"

"No."

"Did you ever fly with a total of four people aboard?"

"Yes. All the time. It was standard procedure until three or four weeks ago."

"Did you have full fuel loads?"

"Yes. Many times."

"Do you have sufficient technical manuals?"

"Yes. We're up to date. We don't have much trouble with manuals."

"Do you have any trouble getting pilots to test fly aircraft?"

"Yes. It's a real hassle. Even the maintenance officer is always out flying missions. The majority of the time, a test pilot is not available to perform a maintenance operational check or test flight. The only way I can get a maintenance operational check or test flight is when all the aircraft are red X'd and there's nothing to fly."

"How many duties do you have?"

"Maintenance NCO, operations NCO, technical inspector, tech supply, anything and everything. I feel that I don't have enough time to devote to maintenance."

"Do you have enough crew chiefs and mechanics?"

"We have enough crew chiefs, but we don't have any mechanics."

"How many of your crew chiefs are school trained in OH-6As?"

"One."

"How many crew chiefs do you have?"

"Four."

"How many OH-6As do you have?"

"Five."

Investigation of the unit's operations section revealed that DA Form 1080s are not normally filed for flights by this unit. Investigation of the unit's maintenance program revealed the statements made by the technical inspector were correct. Many aircraft discrepancies were evident in the inspection and maintenance records. Many of the discrepancy entries were eventually dropped from the record with no corrective action shown.

180 DEGREES DOWNWIND

It was also noticeable that many days would elapse before discrepancies were corrected.

Analysis: ". . . The pilot made a poor decision when he elected to autorotate back to the LZ. Adequate forced landing areas were available to the front and sides of the takeoff path. If he had chosen a site to his front, he would not have had to turn 180 degrees and could have taken advantage of a 10- to 15-knot headwind. The LZ was also located on a plateau approximately 100 feet high and the helicopter was directly over the edge of the plateau when the engine failed. Therefore, if the pilot had chosen to autorotate ahead, he would have had an additional 100 feet of altitude to improve his chances for a successful autorotation.

". . . The unit did not have enough maintenance personnel or equipment to properly maintain five OH-6As."

While flight gloves were available for issue, the pilot did not have and was not wearing gloves. He was also flying with his visor up.

It was found that unit aircraft were flown with 300 to 400 pounds of fuel and three passengers, in addition to the pilot.

The aircraft accident investigation board listed the following established cause factors:

Engine failure. Note: The cause of engine failure could not be determined. A malfunction of the fuel system was suspected.

The pilot elected to turn 180 degrees downwind at 100 feet above ground level and failed to consider the forced landing areas available ahead and to the sides of his takeoff path.

The unit had a poor maintenance program and a marginal safety program. It did not comply with the SOP requiring pilots to file DA Form 1080s for flight.

Recommendations:

"1. That unit aviators receive instructions emphasizing the importance of the flight envelope.

"2. That a team of highly experienced maintenance technicians and advisors visit the unit to give advice about how a more effective maintenance program can be established.

"3. That command emphasis be placed on the unit's safety program."

IN VIOLATION OF COMMAND REGULATIONS

AN OH-6A PILOT WAS flying the second of two helicopters on a ferry flight, with one passenger aboard. While over a bay at 100 feet and approximately 90 knots, the engine failed.

Pilot: "I immediately went into autorotation, turning inland toward the beach. I tried to cushion the helicopter on the water, but as we hit, I think a wave caught the tail. The wave, plus the forward speed, caused us to go inverted and the helicopter disintegrated in the water, which was 15 to 20 feet deep.

"I immediately unbuckled myself and started helping the passenger. I pulled him out of the water and up on the fuselage, which was still afloat at that time. The lead pilot, who was ahead of us about a quarter of a mile, realized we had gone down and came to our position."

Lead pilot: ". . . When I got back to the crash scene, the pilot and passenger were climbing onto the belly of the upside down helicopter. I hovered down to see what kind of condition they were in and they motioned they were going to swim to shallow water about 20 to 30 yards away. They started trying to swim and I went to altitude to make a call for help. I had to climb to about 2,000 feet before I could make contact.

"After calling, I immediately returned to them and, as we got closer, we saw they were having difficulty swimming and we saw four or five large sharks approaching their position. I hurried to them and motioned for them to grab the skids and hold on. I lowered the helicopter and put the skids in the water so they could climb on. I picked them up just out of the water so they would not drag and put them down on the nearest shore about 100 feet away. I lowered the helicopter and they climbed in. We took them to a field hospital."

Analysis: "This accident resulted from engine failure at low altitude. The cause of engine failure has not been determined at this time. The severity of the damage was due to a high rate of air speed upon contact with the water. A supervisory factor was involved in that the lead pilot elected to fly over water in violation of command regulations."

A UH-1H aircraft commander was flying number three in a loose trail formation of four. As they flew across water, the AC saw a destroyer in the bay. He veered to the right and descended to an altitude of 1 to 5 feet above the water. The crew chief and door gunner opened the cargo doors and the helicopter was flown parallel to the port side of the destroyer.

Reaching the stern of the ship, the AC made a cyclic climb to approximately 200 feet. He decreased air speed to about 40 knots at the top of the climb and made a sharp left turn. He then began a dive, with his flight path parallel to the starboard side of the destroyer. During descent, air speed increased to 95 to 100 knots and the AC and pilot were unable to recover from the descent. The helicopter hit the water with skids level and fire and explosion resulted.

The AC, in the left seat, escaped through the left cargo compartment. The entire right side and top of the pilot compartment separated and the pilot escaped through the top. The helicopter was submerged when they escaped. Neither the AC nor the pilot saw the gunner or crew chief. The AC and pilot were rescued by a boat from the destroyer. Both sustained major injuries. The crew chief's body was recovered 4 days later and the gunner's body was never found.

Three hours after the accident there was no eivdence of wreckage on the surface of the water. Four days later, a major portion of the helicopter was recovered. While the wreckage provided no evidence of mechanical failure prior to the crash, the condition of the seatbelts in the crew chief's and gunner's compartments indicated they were not in use at the time of the crash. This was substantiated by the AC and pilot.

Established cause factors included the AC's failure to recover from the dive and the pilot's failure to maintain alertness in that he was unaware of their dangerous situation. Both demonstrated a lack of discipline by buzzing the destroyer, by varying the flight route from their predetermined course and by attempting an unauthorized maneuver.

A suspected cause factor was the lack of familiar references over water which could have resulted in a loss of depth perception, although the AC and pilot did not believe this occurred.

A nonrelated supervisory factor was failure of the crew chief and gunner to wear their safety belts. Although this did not contribute to the accident, it did contribute to their failure to survive the crash.

The aircraft accident investigation board recommended increased emphasis on the consequences of illegal flight maneuvers. It also recommended increased emphasis on crew responsibilities, specifically the duty of the AC to ensure the use of safety belts at all times. And it recommended the widest possible dissemination of the overall aspects of the senseless and tragic accident.

SENSELESS AND TRAGIC

WHAT WE CAN DO ABOUT MAINTENANCE-CAUSED MISHAPS

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THIS ARTICLE IS aimed primarily at maintenance mistakes by all persons concerned with maintaining Army aircraft, either as crew chiefs, technical inspectors or maintenance supervisors. It is also aimed at air crews, where the shoe fits. I have been in Army aviation as crew chief, TI and maintenance supervisor for more years than I care to count and I have been at USABAAR for 2 years. Here, I have read many reports of accidents caused by maintenance mistakes which have set my teeth on edge. A case in point is a minor accident which involved an in-flight fire.

A UH-1D had been in flight a very short time when there was a fire in the lower left avionics compartment. Fortunately, the crew was able to return and land without injury and with only minor damage to the helicopter. The AC, who had 339 hours in UH-1Ds, made this statement: "I checked all compartments, including the avionics compartment, although, at the time, I thought it was a cargo compartment." Following is a list of items found in the burned avionics compartment during the investigation:

- Two cans of hydraulic fluid
- One can of engine oil
- One can of transmission oil
- One smoke grenade rack, without grenades
- One oil can, with spout
- One can of GOB grease
- Two MEA vests
- One rain jacket, with hood
- Various sizes of oily rags
- Various sizes of nylon tie-down ropes
- One magazine
- One can of commercial liquid wax

The fire was started by one of the cans of hydraulic fluid shorting the nonessential bus bar. In reviewing this report, these questions come to mind. What did they teach the AC when he was transitioning into this helicopter? What did they teach the crew chief? Where were all the TIs and supervisors assigned to this unit? Where was command supervision from the top down? What if the helicopter had been over unsuitable terrain and unable to return to a safe landing area?

This kind of accident is completely unnecessary and can be prevented with proper supervision. Young mechanics fresh out of school don't know all they need to know and must turn to TMs, TIs and supervisors for help. If TIs and supervisors spend their time in maintenance shacks drinking coffee, these mechanics won't get the help they need. By-the-book maintenance is an absolute must for Army aviation. The -20s for UH-1 and AH-1 helicopters clearly detail how to install tail rotor pitch change bearings. But there have been many tail rotor failures caused by improper installation of these bearings. By-the-book should be the motto of all concerned with aircraft maintenance. If you read the book and are still confused, don't be afraid to ask questions. Never try to remember torques and tolerances because they may be changed by TM changes. *Always* use the TM when working on aircraft.

The reuse of castellated self-locking nuts in critical applications is no longer permitted, but time and again, this is done. Is it carelessness or is it condoned because of a shortage of nuts? Command supervision and by-

the-book maintenance can stop the unnecessary waste resulting from this malpractice.

The Army has had flying evaluation boards for pilots a long time. Why not a maintenance evaluation board for crew chiefs, TIs and supervisors? A young aviation maintenance officer may be snowed by an old line NCO for a short time if he is a do-nothing, know-nothing type. Eventually, he'll be caught. When he is, he should not be pushed off for another unit to contend with, but should be removed from the aviation field. I am not saying that a TI should do a supervisor's job, or a supervisor should do a TI's job. Both have definite jobs to accomplish and they should be capable of doing their jobs. The MOS test does not do the job it was designed to do. A man may be great as a wrench bender, but poor in putting answers on paper. A bad supervisor or TI can be a coffee carrier for his AMO or CO and get a good evaluation.

If all mechanics, crew chiefs, TIs and supervisors would ask themselves the following questions before, during and after each task, there would be fewer maintenance mistake accidents: Is my work or inspection good enough that I would fly in this aircraft? Would I let my wife, mother or girl friend fly in it?

If your answers to these questions are yes, you're doing your job!

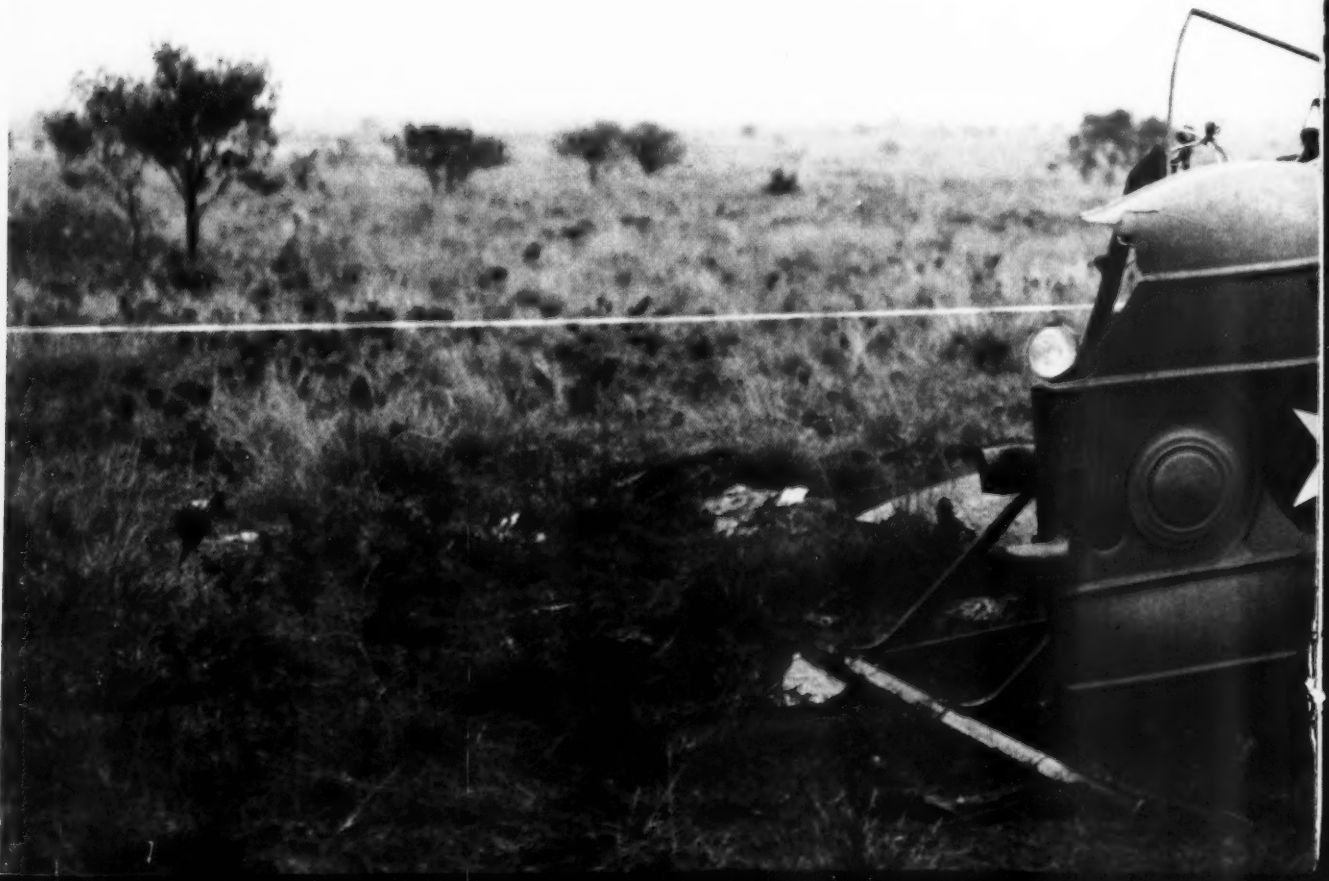
Accident Briefs

A TH-55A PILOT was assigned a night test flight. After completing the runup, he hovered out for a takeoff to the south. During climbout, after crossing the field boundary, the helicopter made a low level left turn, followed by a right turn, then began a steep descent and crashed. It struck the ground in a nose high, right bank, while drifting toward the right rear. The right skid collapsed at impact and the helicopter came to rest inverted, trapping the pilot in the cockpit. After the engine was shut down, the helicopter was rolled on its left side to free the pilot. He sustained a probable concussion and lacerations.

Mechanic: "The helicopter was up for a rough engine. I performed a preflight inspection and found no discrepancies during the runup. We left the panel in a normal climb and made a left turn. Our altitude was about 50 to 75 feet. As we left, I recall that everything looked hazy and after we made our left turn, we entered a solid wall of fog. The pilot immediately lowered collective and descended until we struck the ground, still in fog. Just before the crash, I could see the ground and it appeared to be going backwards. I think it hit the ground tail boom first. After that, I can't recall much except leaving through the broken bubble. Prior to leaving the panel, I didn't see any fog, but it did appear hazy. The pilot made a comment that it was hazy about 15 minutes before takeoff. During the runup and magneto check, the engine was running well and everything seemed to be in good shape."

Statements from maintenance personnel working at the heliport indicated that, about 1 hour before the test flight, stratus clouds and patches of fog began to develop along a river located 2½ to 3 miles south and east of the heliport. This condition continued to develop and, with a light southeast wind, gradually moved upslope, occasionally spilling over the river bluff east and southeast of the heliport. The general area became hazy and progressed into fog and low stratus patches east and southeast of the heliport.

This condition could have been forecast if a request had been received and conditions observed to be developing had been reported by the pilots to the forecaster on duty. This was a local isolated condition peculiar to the area, particularly to the east and south of the heliport during nighttime. It did not cover a wide area. The stratus formations were probably 50 to 200 feet thick and



their bases were probably 50 feet or higher as they came over the bluff. As it advected into the heliport area, the stratus would tend to lower to the ground, becoming ground based fog. In the early stages of formation, as it moved westward over the heliport, it would tend to dissipate. Later, the fog thickened and moved in on the heliport. In low patches, visibility could be expected to be as low as one-quarter mile.

The 24-hour forecast, while not received by the test flight section, reflected no weather that would have resulted in discontinuance of test flying. The weather condition that developed was a natural phenomenon, peculiar and isolated to the heliport area. The only way it could have been forecast would have been for test pilots to have advised the forecaster of the conditions developing along the river valley.

Time factors indicated the pilot was on the ground when the low stratus and fog began moving in. He was probably not in radio contact with the tower or other aircraft, as he did not remember any transmissions concerning weather. When he began the takeoff, there had been a 21-minute interval since his last flight. It was during this time that the weather rapidly deteriorated, unknown to him. The tower operator did not advise him of the changing condition because he thought the pilot was aware of it from his previous flight.

The aircraft accident investigation board listed the causes of this accident as:

"1. Operator error in that the pilot inadvertently flew into instrument flight conditions in an aircraft not equipped for instrument flight, and violated AR 95-2 by inadvertently flying into weather conditions that were below prescribed night visual flight rule minimums.

"2. Supervisory error in that the senior pilots on duty failed to properly evaluate the rapidly deteriorating weather conditions and to discontinue test flight operations prior to the accident.

"3. Physiological factor in that the pilot became spatially disoriented and crashed."

The board's recommendations were:

"1. The requirement for night test flying be reevaluated . . .

"2. Prescribed weather minimums for both day and night operations be reemphasized to flight test pilots.

"3. Each flight test shift leader obtain a weather briefing for his shift from the base weather forecasters."

NIGHT TEST FLIGHT

TWO YEARS ARE two years. Two tours in Vietnam can be a lot longer. For all too many it is eternal. Second tour Army aviators should have matured considerably. Unfortunately, this is not always the case.

My first tour was spent in Hueys. I remember reading safety publications about deaths, injuries and damages. All too often the accidents I read about resulted from low level flights. This is one of the most frequently seen examples of immature aviation at work. No one can deny the extra tingle and thrill a pilot feels as he speeds along close to the ground between the trees. I know. I felt it. But there's no thrill any more—just a cold chill as I count many friends who are dead because they low-leveled once too often. Their epitaphs could well read, ". . . and with utter disregard for his personal safety and that of his passengers and crew, he passed into history."

Did you ever take the doughnut dollies for a *real* ride? Have you ever taken a guy to the replacement battalion for DEROS and given him his last good look at Vietnam? I did and I was stupid. Because I was lucky, I was always able to finish my flights by signing off the dash 13.

My second tour has been in fixed wing airplanes and I have read in the same publications that my friends are still literally dying to fly low level. My flying attitude has matured to the point that unnecessary low level flight only seems childish and dangerous. What can be done to stop the pilots from flying toward self-destruction?

The answer lies not so much in posters and articles in publications. It must come from mature, concerned aviators. They must set the example

for immature aviators by word and deed. When a pilot is in the bar telling how he almost knocked a guy off a bicycle, tell him you think it was just plain stupid and a good way to knock himself off. You don't have to worry about losing friends. If they continue to think it's cool to drag the skids through trees, fly under bridges and water ski without a boat, you'll be losing them soon anyway.

Helicopter pilots don't have the market cornered on immature flying. When was the last time one of you 0-1 pilots, who I'm sure have been helping me point the fixed-wing finger decided to initiate your new observer and get him down where he could really see? How about the OV-1 pilot who wants to show the U-8 crew what a real pilot and real airplane can do and sneaks up on their wing upside down? Then there's the U-21 pilot with his VIP passengers. They have an important appointment to keep and he's not going to let any O-1 cut him out of traffic. After all, he was in the right. He might be dead right and the appointment his passengers keep, while important, may be a few years premature.

I am trying every day to mature along with my flying experience. I invite you to join me in approaching every flight in a professional and mature manner. We may not be gifted enough to be the smoothest pilots, no matter how hard we try. But we can and must strive to be the safest and most mature through constant practice. If not, immaturity and reckless flying may well shorten your tour in Vietnam. I hope not. I've lost enough friends. Haven't you?

CW2 David R. Katz
144th Aviation Company (RR)

USAASO Sez

The U. S. Army Aeronautical Services Office discusses

ATC tips

Flight information manuals

ATC Tips: There have been many instances when GCA controllers have lost radar contact due to rain clutter. In the majority of cases the controllers have lost radar contact in precipitation for two reasons:

- Gain control was turned too high.
- There was excessive water on the dome on the end of the antenna horn.

These two problems can be considerably reduced by using lower gain settings or have maintenance personnel coat the dome on the antenna horn every 2 or 3 months with Dupont's #630 silicone.

Flight Information Technical Manuals and Reference Documents: Where can I requisition flight information technical manuals and Federal Air Regulations? AR 95-14 explains that these requests will be forwarded to the USAASO activity supporting your geographic area.

AR 95-14 establishes responsibilities and procedures for executing the Army aviation flight information program. It provides instructions for the requisition and distribution of flight information documents. These documents consist of aeronautical maps, charts and publications required by aviators, air crews, air traffic control activities and command agencies for planning, conducting and controlling aircraft operations.

USAASO has established and implemented procedures for distribution control of all publications listed in AR 95-14 and DOD Catalog of Aeronautical Charts and Flight Information Publications. The DOD catalog is the official guide for ordering basic aeronautical charts and FLIP publications to support the Army aviation air navigation requirements.

All aviators operating Army aircraft will ensure that they have available and are familiar with all the current flight information documents required to perform their mission safely and efficiently.

All air traffic controllers performing air traffic control services will ensure that they have available and are familiar with those publications and directives governing the daily operations of the facility.

Technical manuals and FAA publications are issued on an as required basis not to exceed the basis of issue criteria described in Appendix B, AR 95-14.

FAR Volume VI is issued automatically if an addressee is receiving FLIP planning documents. Other volumes of FARs will be purchased with local funds from the Superintendent of Documents, Government Printing Office, Washington, D. C. 20402. The price of each volume is published in the FEDERAL REGISTER printed by the Department of Transportation, Federal Aviation Administration.

Annual Writing Awards

1st Place: Complacency Kills
2nd Place: Technique or Lack of Knowledge?
3rd Place: Operation Camille

Jul—CPT John W. Griffin
Aug—CW3 Arthur R. Sobey
Sep—CW3 Arel E. Childress
Oct—Wesley M. Veazey
Nov—MAJ Howard J. Stiles
Dec—LTC Richard H. Marshall

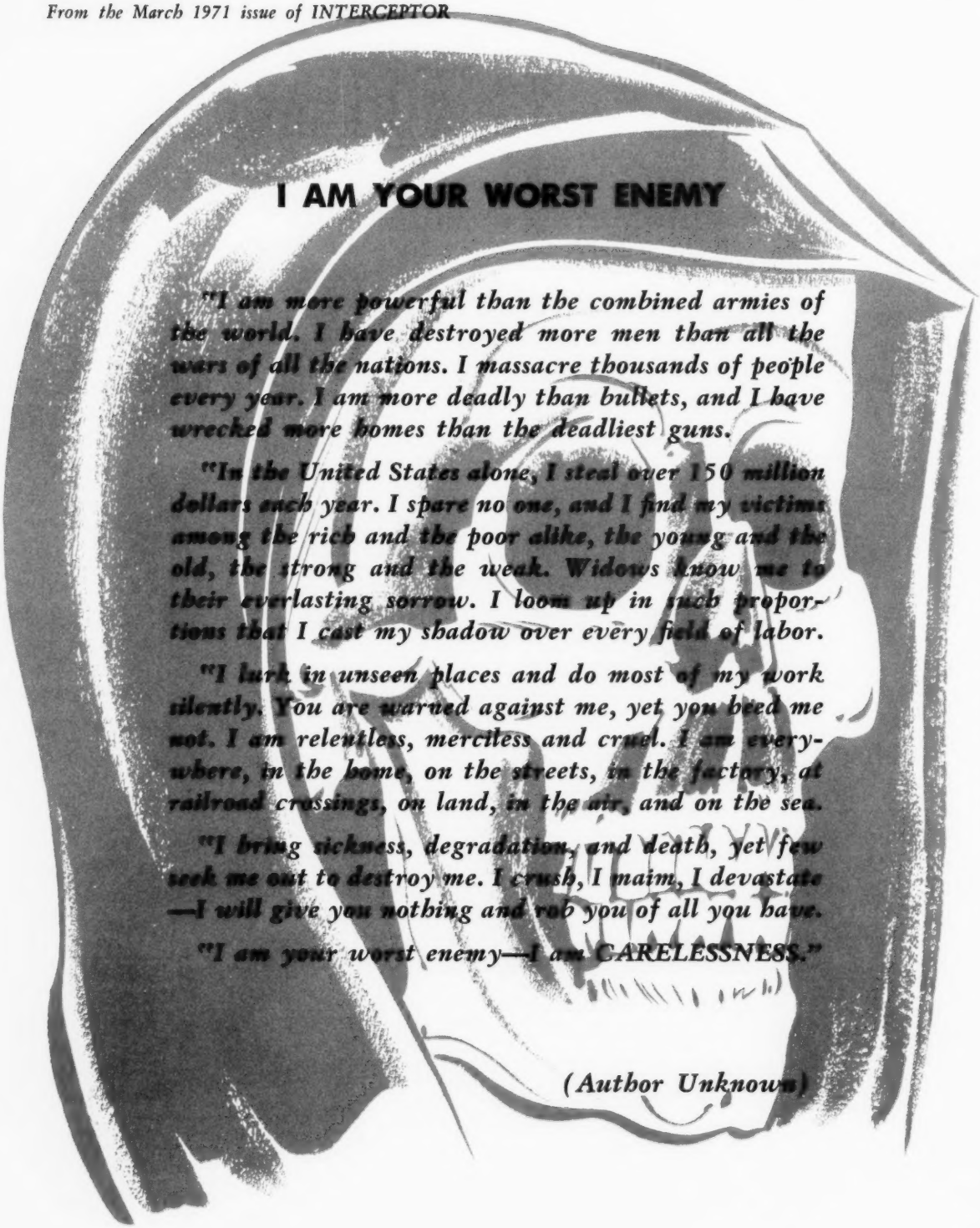
Jan—CPT William J. Ely Jr.
Feb—MAJ Robert S. Fairweather Jr.
Mar—LTC Donald R. Jordan
Apr—CW3 Leroy B. Spivey
May—CW4 Paul L. Pagano
Jun—COL Jay D. Vanderpool (Ret)

YOUR NAME COULD be among those listed in the winner's circle if you submit an article for the **AVIATION DIGEST**'s eleventh annual writing contest beginning this month. Each month the author of the article selected as the best of that issue receives an engraved plaque and a cash award of $25. From these monthly winners, the three best articles of the year are selected for prizes of $250, $150 and $100 respectively. Last year's monthly winners are listed above with the top three prize winners.

To be eligible an article must be original and concern Army aviation or related subjects. Dual authored articles are not eligible for the contest, but this rule does not prevent their selection for publication. Authors of published articles will also receive credit in their 201 file.

Winning articles are selected by judges who review the manuscripts in original, unedited forms without bylines. Selection is based on accuracy, completeness, originality, readability, soundness, substance and overall merit.

From the March 1971 issue of INTERCEPTOR



I AM YOUR WORST ENEMY

"I am more powerful than the combined armies of the world. I have destroyed more men than all the wars of all the nations. I massacre thousands of people every year. I am more deadly than bullets, and I have wrecked more homes than the deadliest guns.

"In the United States alone, I steal over 150 million dollars each year. I spare no one, and I find my victims among the rich and the poor alike, the young and the old, the strong and the weak. Widows know me to their everlasting sorrow. I loom up in such proportions that I cast my shadow over every field of labor.

"I lurk in unseen places and do most of my work silently. You are warned against me, yet you heed me not. I am relentless, merciless and cruel. I am everywhere, in the home, on the streets, in the factory, at railroad crossings, on land, in the air, and on the sea.

"I bring sickness, degradation, and death, yet few seek me out to destroy me. I crush, I maim, I devastate —I will give you nothing and rob you of all you have.

"I am your worst enemy—I am CARELESSNESS."

(Author Unknown)